'Local Milk for Local Schools?': Children Dairy Consumption Behaviours, Willingness to Pay and Health in Indonesia

Risti Permani(a), Nunung Nuryartono(b), Fikria Ulfa Wardani (b), Triana Anggraenie (b)

a) University of Adelaide; b) Bogor Agricultural University

Contributed paper prepared for presentation at the 59th AARES Annual Conference, Rotorua, New Zealand, February 10-13, 2015

'Local Milk for Local Schools?': Children Dairy Consumption Behaviours, Willingness to Pay and Health in Indonesia

Paper presented at the the AARES 2015 Annual Conference in Rotorua, New Zealand

Risti Permani[a)], Nunung Nuryartono[b)], Fikria Ulfa Wardani [b)], Triana Anggraenie [b)],

[a)] University of Adelaide; [b)] Bogor Agricultural University

This version: 27 February 2015

Please do not cite without permission

Abstract

School milk programs have potentials to better linking farmers to markets and increasing dairy consumption in addition to providing nutritional benefits and positive impacts on academic performance. To our knowledge, this is the first study that links between school-aged children dairy consumption behaviours and Willingness-To-Pay (WTP) within the context of SMPs in developing countries. Using data from a school-based survey targeting over 500 primary school students in Sukabumi, West Java, Indonesia, this study examines student's diet diversity, food security status, dairy consumption behaviours, pocket money's allocation, WTP and SMPs' impacts on health indicators based on a micro-econometric analysis. An instrumental variable model is applied to address the endogeneity of a variable on school participation at milk programs. The idea is to understand how much pocket money the students would spend on dairy products and to compare some health indicators between students in participating and non-participating schools. Consideration of this pocket money allocation is important to assess the sustainability of such a student-funded milk program and explore an alternative to government-funded programs.

Keywords: dairy, Indonesia, school milk program, pocket money, Willingness-To-Pay (WTP)

JEL codes: I18, E21

1. Introduction

According to the Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD) and the World Food Programme (WFP) (2014), about 805 million people are estimated to be chronically undernourished in 2012-2014. It is argued that "hunger reduction requires an integrated approach" where interventions to boost agricultural productivity growth can be most effective when accompanied by social protection programs (FAO; IFAD and WFP 2014). One program that has been frequently cited as a way to reduce hunger is school feeding programs.[1]

School feeding programmes have attracted attention from many governments in developing countries especially those who aim to fight for hunger and malnourishment. In 2008, SFPs existed in 68 countries; Most of the programs have been initiated and funded by the WFP (WFP 2008). The widespread implementation of SFPs has been driven by multiple objectives that those programs can potentially achieve. The objectives include: i) to procure food from smallholder producers, and therefore raise their income to ensure more nutritious foods can be accessed by their family; and ii) to allow school students consume nutritious foods that otherwise would not have been accessible. In many developing countries, the school meal is the main meal of the day indicating the potential contribution of the program to students' overall diets. Reduction in short-term hunger during the school day is also expected to expand students' concentration span and, therefore, improve their academic performance.

One country that has been successful implementing a school feeding program is Brazil. Started in 1950s, its national school meals program provides free meals to all public school students, equivalent to more than 43 million children in 2012. The program has been able to reduce the prevalence of undernourishment by about one-third compared with it would likely have been without the program (FAO; IFAD and WFP 2014). With average daily cost per child at US$0.27 (to serve fresh fruits and vegetables in school meals four days a week and one snack on the fifth school day), the program has also encouraged 80 per cent of participating public schools to directly procure from smallholder farmers (Otsuki and Arce 2007; FAO; IFAD and WFP 2014).

A literature review shows that relevant studies on school feeding programs tend to focus on the success of school feeding programs in achieving their nutritional objectives. A further literature search suggests a relatively consistent positive effect of school feeding programs on "the energy intake and micronutrient status of school-aged children, and a decrease in infections and morbidities but mixed findings in terms of their impacts on weight, height and BMI gains" (Jomaa *et al.* 2011). Even when we specifically look at a commodity that is considered to be "effective commodity"[2] such as cow's milk, mixed findings are presented. A study in Peru for example finds no evidence that the nutritional objectives are being achieved by the national school milk programs (Stifel and Alderman 2006).

Whilst these studies have shed lights on the impacts of school feeding programs, little has been discussed about the financing of such programs. In most countries, school feeding programs are government-driven. Such programs may be justified due to the presence of market failures. First, the programs may be designed to target vulnerable groups for example young children based on a possibility that intra-household allocations may not reflect the rates of return to investments in

[1] According to WFP (2004), the programs can be delivered in various forms. The WFP defines that all of the following can be classified as school feeding: i) "take home" food rations in return for a child's regular attendance at school; ii) food provided to adults or youth who attend literacy or vocational training; iii) food for pre-school activities with an educational component; and iv) at-school meals

[2] This 'effective commodity' term is used by Stifel and Alderman (2006).

children; Second, it may also be driven by underinvestments in education (Stifel and Alderman 2006). A particular question, what if the government could not afford or were not willing to finance or even subsidise such school feeding programs? How much would potential participants be willing to pay?

Given the above background, this study investigates an independent or student-funded school milk programs in Indonesia. To our knowledge, this study is set to be the first study on developing 'independent' school feeding programs. The choice of Indonesia as a case study is ideal. As in other developing countries, hunger and malnutrition remains a pressing issue and unfortunately, school feeding programs have been inactive for a number of years. There is, however, a model of student-funded school milk programs that we think have potential to be replicated in other parts of Indonesia and other developing countries.

In Sukabumi, West Java, Indonesia, 368 schools out of 1,602 primary schools in the region participated in a school milk program initiated by a smallholder-initiated dairy cooperative and processor, namely Makmur Agro Satwa (MAS). The program allows thousands of primary school students from low-income families to purchase yoghurt sticks (cost US$0.10) once a week.

Initiated by smallholder dairy farmers, the MAS business model is unique. It has successfully upgraded its activities from traditional dairy farming to processing. The MAS is also sourcing fresh milk from more than 100 local dairy farmers and involving farmers' wives in milk processing implying its potential contribution to the local economic growth and women empowerment. The MAS diversifies its market from only having one dairy cooperative as its buyer, to thousands of primary school students through school milk programs (SMPs). The utilisation of SMPs as part of the MAS' marketing strategy means that such a model not only helps smallholders improve their market access but also may promote food security considering its potential nutritional benefits for participating students.

What is more interesting is that these MAS-led SMPs are innovatively developed based on 'guaranteed purchase arrangements' at the school level. Prior to joining the SMPs, students and their parents were invited to information sessions organised by MAS to assist parents better understand the health benefits of milk consumption. Once the school agrees, a contract specifying an exact delivery day and quantity between the school and MAS is made. The contract means that children agree to allocate their pocket money to purchase dairy products sold by MAS; and from MAS' perspective, such a contract significantly lower risks of losses from unsold products considering the perishable nature of dairy products.

Apart from giving the MAS leaders' some prestigious awards, government or other institutions' support for MAS has been very minimal. This MAS model is highly dependent on consumers' 'genuine' interests as well as their Willingness-To-Pay (WTP). Therefore, understanding of consumers' WTP would not only allow smallholder processors such as MAS to identify future market development but also allow both central and local governments or other institutions to identify rationale for assistance, for example the level of subsidies required to ensure students from low socio-economic background can afford to consume milk. The WTP estimate can also forecast market response to price changes.

Given the above background, using a case study of the MAS model in Indonesia, this study conducted a survey to over 500 primary school students in October 2014. This project was a collaborative effort between the University of Adelaide and Bogor Agricultural University, funded by the Indonesia Project at the Australian National University. The survey investigated students' diet diversity, food

security status, dairy consumption behaviours, pocket money's allocation, WTP and SMPs' impacts on health indicators based on a micro-econometric analysis. The idea is to understand how much pocket money the students would spend on dairy products and to compare some performance indicators between students in 'SMP schools' and non-SMP schools. Consideration of this pocket money allocation is important to assess the sustainability of such a program especially when the government reduces its budget.

The study focuses on six primary schools in Sukabumi City (*Kota Sukabumi*) and Sukabumi Municipality (*Kabupaten Sukabumi*) in West Java, Indonesia representing urban and rural areas, respectively. The two regions are located in West Java Province which contributes about one-fourth of total milk production in Indonesia. Despite its tremendous potentials, dairy sector in this area remains relatively underdeveloped and under-researched compared to other municipalities in West Java such as Bandung, Garut and Bogor. In 2013, of 26 municipalities and cities, Sukabumi municipality was the 6th largest milk producer in West Java while Sukabumi city was the 20th.

The contribution of this study to the existing literature is multi-fold. First, as mentioned above, we look at a student-funded school milk program that has not been addressed by any studies in neither developing nor developed countries. While the development of such a student-funded school milk program is encouraging, scaling out and scaling up such a program requires a better understanding of the program's effectiveness at achieving its nutritional, academic and other objectives. This knowledge can motivate and improve the delivery of similar programs in other regions.

Second, this study assumes students as decision makers. Whilst this is not the first economics study that looks at children's decision making process in particular in regard to consumption preferences (Abramovitch *et al.* 1991), within the context of SMPs studies, most studies assume that the consumption of a child is "almost completely within the control of parents" (Afridi 2010). Field observations in Indonesia suggest that many primary school students manage the distribution of their 'pocket money'. Hence, to some extent, this study is related to literature on students' pocket money coming from psychology as well economics disciplines (Furnham and Thomas 1984; Furnham 1999; Scott and Lewis 2000; Barnet-Verzat and Wolff 2002).

As our third and key contribution, we attempt to explore the WTP of primary school-aged children. We are aware of studies on adolescents' WTP (Chen *et al.* 2008). However, there seems to be no study that looks at primary school students' WTP. Whilst in practice this could be very challenging, our survey suggests that most students (95 per cent) responded well to WTP questions by stating WTP that is payable (i.e. within their daily allowance).

The remaining of this paper is as follows. Section 2 presents a brief overview of dairy industry in Indonesia. Section 3 reviews school feeding programs across countries including their food security and socio-economic impacts with particular reference to SMPs. Section 4 briefly reviews school milk programs in Indonesia. Section 5 describes the methodology applied in this study. Section 6 presents the results of empirical analysis. Section 7 concludes.

2. Overview of dairy industry in Indonesia

Indonesia's growing income leads to diversification of food consumption. Whilst rice remains an important commodity, there is an increasing demand for non-staple and high-protein food commodities including dairy products. This has encouraged agribusiness development in sectors such as dairy, high value agricultural commodities such as fruits and vegetables, and beef sectors.

Recent development in Indonesian dairy industry has been generally positive. Annual fresh milk production in 2010 was twice the level in 1990s. However, looking at a longer period, dairy industry growth in terms of dairy cow population growth, yield per animal and fresh milk production, has been relatively volatile (Figure 1). Local production capacity can only meet less than one third of local demand for milk products (currently 10-11 litre per capita per annum), decreased from 47% of local consumption in 2007. Although domestic production continues to increase by an average of 8% between 2005 and 2010 (FAO 2012), local demand seems to grow at a much faster rate.

Increasing fresh milk production in Indonesia in order to achieve milk self-sufficiency is challenging. Typical farmers with 3-4 dairy cows have limited implementation of basic animal husbandry and farm practises. In addition to the lack of access to market information, their diseconomies of scale have impacted their lack of bargaining power in price determination compared to co-ops (village cooperatives (KUDs) under the Union of Indonesian dairy cooperatives (GKSI)) and milk processors (represented by Association of dairy processors (IPS)).

One potential program to encourage increased milk production (as well as consumption) is school milk programs (SMPs). SMPs have potentials to better link farmers with consumers ie schools and provide them improved bargaining positions. At the moment, 95% of total fresh milk production is sold to IPS. In addition to limited cooling units, such limited marketing channels may adversely impact the smallholder's welfare. Despite its potential, analysis of SMPs' effectiveness and implementation in Indonesia is under-researched.

Despite a big number of newspaper articles on Indonesian dairy industry, to the authors' knowledge, there are only few recent studies on Indonesian dairy industry especially the ones published in English (Erwidodo and Trewin 1996; Riethmuller et al. 1999; Priyanti et al. 2004; Fabiosa 2005; Morey 2011). Most studies on dairy focus on technical aspects for example the ones conducted by ICARD. Whilst these studies are useful to provide industry background, little (perhaps none) has been done to evaluate the design and delivery of SMPs.

3. Overview of School Milk Programs (SMPs)

SMPs are highly relevant to all of the four dimensions of food security: availability, access, utilisation and stability of the other three aspects. First, it has potentials to increase production of smallholders (through better access to markets) i.e. the *availability* component of food security. As demonstrated in Thailand, since 1992 when school milk program was launched the Thai dairy sector experienced rapid growth. Figure 2 presents a consistent increasing trend in Thai cow's milk production since the program launch. The growth in dairy industry is also reflected by increasing number of dairy farmers, cattle population, yield, number of dairy cooperatives and processing capacity. It has been argued that SMPs play a key role in this process (Jabbar and Ahuja 2011). Second, SMPs can also provide improved access for students from low-income families to nutritious milk products. This demonstrates the relevance of SMPs to the *access* and *utilisation* pillars of food security.

As previously mentioned, empirical studies, however, present mixed findings on the effectiveness of SMPs at achieving nutritional objectives. Some studies suggest that milk consumption may bring positive health impacts at present and in adulthood, including on bone metabolism, height growth and reduced risks of colorectal cancer (Okada 2004; Zhu *et al.* 2005; Cox and Sneyd 2011). A study in Vietnam, for example, suggest that regular milk consumption reduces the incidence of underweight and stunting by about 10 per cent (Lien *et al.* 2009).

Whilst benefits from milk consumption are quite evident, many studies fail to find supporting evidence that SMPs are able to achieve their nutritional objectives (Stifel and Alderman 2006). This may mean the need to explore the view that without additional measures, milk programs cannot address malnutrition (Stifel and Alderman 2006). To some extent, irregular implementation of school milk programs can also affect the success of SMPs in achieving their nutritional targets.

Although stronger empirical evidence of their nutritional outcomes is still required, it is believed that potential nutritional benefits from SMPs may not only positively influence participating students' health but also their academic achievements. Many argue that under nutrition is one of the main barriers to children's learning (Alderman 2001; Glewwe *et al.* 2001; Aturupane *et al.* 2011). Therefore, school milk programs may be an effective strategy to target children's academic performance. The choice of health indicators, however, can affect the significance of SMPs on academic performance. For example, a study in Vietnam suggests that academic performance (as measured by test scores in mathematics and local language) are significantly negatively correlated with z-scores of height-for-age and weight-for-age but not with weight-for-height (Lien *et al.* 2009). However, results may vary between groups of students. A controlled experiment in Iran, for example, suggests that daily milk consumption has increased school performance but only among girls (Rahmani *et al.* 2011).

Quite often, the objectives of school feeding programs cover aspects beyond nutrition and academic achievements. In Bangladesh, the goals of such school feeding programs are set not only to improve the nutritional status but also academic attainment but also improve school management practises with particular attention is given to female students and school staff (Jabbar and Ahuja 2011).

While there have been a large number of school milk programs across the world, coordination and knowledge transfers between stakeholders in different countries are rather limited. To the authors' knowledge, the FAO is the only agency that has been serving as "a world centre" for collecting data on school milk programs and provided assistance to countries wishing to develop such programs since 1997 (Griffin 2005). Yet, its recent activities seem to be limited to information exchange through an electronic mailing list. According to its homepage (http://www.fao.org/economic/est/est-commodities/dairy/school-milk/en/), the last conference that was organised was in mid 2000s.

One major contribution that the school milk unit at the FAO has made was the 2013 school milk program global review (Bryans 2013). The FAO distributed a questionnaire to stakeholders in 62 countries (unfortunately Indonesia was not in the list) covering aspects from forms of subsidy, pricing, availability and distribution of milk products, to administration of SMPs (IDF and FAO 2013). According to Bryans (2013), some of the initial key findings are:

- The administration of SMPs is the responsibility of various agencies: Ministry of Education (35 per cent); Ministry of Agriculture and/or Livestock (24 per cent); Ministry of Health (18 per cent); etc.
- Over 60 per cent of respondents reported that majority of free-milk recipients are children age between 5 and 10 years old;
- The most common dairy product available in schools is plain milk (whole and semi-skimmed);
- Nearly half of respondents reported that the average serving size for school milk is 200-250ml.

The exclusion of Indonesia in the above global school milk review as well as a low number of studies on school milk programs in Indonesia warrant a further investigation into the topic.

4. School Milk Programs in Indonesia

SMPs in Indonesia are evidently under-developed. Nationally, the distribution and administration of the school milk programs has not been well-documented. Most information can only be obtained from media which report 'ceremonial programs' such as commemorating National Milk Day on 1 June.

The authors have obtained scattered information about the programs in several provinces through initial visits and a desktop study. In Sumatra for example, the livestock office reported that in 2013 there were only three primary schools targeted by the program. Unfortunately, the program faced insufficient supply of fresh milk. Local dairy industry in Sumatra was not (and is still not) as developed as the dairy industry in Java. While the original idea of the SMP was to involve local dairy farmers, instead of receiving (pasteurised) fresh milk, students in those three participating schools were given a 125 ml pack of 'liquid' milk (made of fresh milk, powder milk, sugar, etc) every three months. The program's limited scope, irregular implementation and unclear targeting made it difficult to justify the impacts of SMPs on nutritional, academic and other objectives. In East Java, several cooperatives recently received a sterilising facility. Hence, pasteurised milk can be directly distributed to local schools supporting Government school milk programs. In Batu (East Java), local students are consuming free milk every Saturday funded by the local government's program. There is a need to conduct a further investigation into the sustainability and effectiveness of such programs.

Therefore, first this study conducts a mapping study to get insights into the current school milk programs including the ones run by private companies. Figure 3 presents a diagram of the milk program distribution. In general, milk programs are delivered by three main parties, namely the private sector, the governments (local and central governments), and NGOs including dairy cooperatives.

In regard to the role of the private sector, there are a number of commercial dairy processors who run milk programs. Programs vary between companies. However, most of these processors badge these milk programs as part of their Corporate Social Responsibility (CSR) programs. Most of these programs are not regular; many are one-offs. These programs do not always directly target schools although majority of these processors target school-aged children. For example, one dairy processor distributes flavoured liquid milk every 6 months to farm households to target farmers' children; another dairy processor distributes dairy products to mosques during the Ramadhan (fasting) month. There is not enough evidence that these private company-led milk programs have improved smallholder dairy producers' market access. Their scales and frequencies also raise concern over their effectiveness at achieving nutritional objectives.

In 2010, the Indonesian government introduced school milk programs. The programs were part of the supplemental food for school children program or PMT-AS (*Program Makanan Tambahan untuk Anak Sekolah*). The PMT-AS scheme was initiated by Ministry of Education and Culture (MoE) and delivered to 27 municipalities (*Kabupaten*) in 27 provinces in Indonesia. The MoE partnered with several other ministries and agencies including Ministry of Health, Ministry of Agriculture, Ministry for National Development Planning (Bappenas), Ministry of Finance.[3]

As summarised by ACDP Indonesia (2011), PMT-AS program had multiple objectives including to:

[3] ACDP Indonesia (2011) provides a nice summary of the roles of each of these ministries in the PMT-AS program.

i. "increase the intake of nutrients to reduce energy problems;
ii. inculcate attitudes and behaviours to enjoy and appreciate local foods;
iii. inculcate clean and healthy lifestyle behaviours (PHBS);
iv. improve children's physical endurance;
v. increase the resilience of students in learning;
vi. increase interest in learning;
vii. reduce absenteeism due to illness;
viii. improve learning achievements of children;
ix. empower members of local communities through involvement in school committees; and
x. increase local community involvement in cultivation of food crops."

PMT-AS allowed school children to consume local foods that were produced by local community groups. The types of food being distributed to students quite varied, from cooked meals prepared by women from Family Welfare Movement or PKK (*Pemberdayaan dan Kesejahteraan Keluarga*) group to fresh milk from local dairy farmers. The Ministry of Health played a key role in setting quality and hygiene standards of the foods being distributed to school children and training PKK women to raise school childrens' health awareness.

Most stakeholders viewed that the impacts of PMT-AS were generally positive. This project conducted interviews with several representatives from various government agencies (e.g. MoE) and other stakeholders (e.g. dairy farm cooperatives and school principals). Most of them viewed that PMT-AS had positive impacts on school attendance rates, learning motivation and academic achievements. However, there is no specific study that evaluates the PMT-AS program. The only study that we are aware of was initiated by ACDP Indonesia (2011). However, no results have been made publicly available.

Whilst many seem to agree with the rationale for PMT-AS, several challenges were quite evident. One main challenge was difficulties to locally supply foods or milk in areas where food and milk production was below what was required by PMT-AS. Another constraint was limited government budget. The program could only reach 6 per cent of total number of primary schools in Indonesia. In 2011, there were 9,336 schools participating at PMT-AS, compared to more than 144,000 primary schools in Indonesia. An interview with the MoE representative suggested that the funding allocations for PMT-AS reached Rp 500 billion per annum. Clearly, scaling up and scaling out would therefore put quite significant financial burden on the government.

The PMT-AS program no longer exists. In 2012, funding for PMT-AS was shifted to other posts such as development of new classrooms, libraries and renovations. As of January 2015, since 2011 the PMT-AS program has never been re-launched.

Despite a large number of scientific articles on benefits from milk consumption and strong recommendations for the Indonesian government to promote SMPs, there doesn't seem to be a clear strategy to develop SMPs in Indonesia. It is not surprising to learn that many public and private programs cannot be sustained for a long period of time and it is not clear what barriers to further the development of SMPs.

Targeting school-aged children, SMPs have promising markets in Indonesia. Although the percentage of under-five children whose weight is too little for their age has been decreasing, the absolute number of children has increased given that the country's population has grown. According to the 2010 Health Survey, one in three Indonesian children under the age of five suffered from malnutrition

- both acute and chronic. Table 2 suggests that in 2010, nearly forty per cent of Indonesian children aged under 5 were stunted (i.e. height-for age malnourished) and nearly one fifth of them were weight-for-age malnourished. The percentages are higher than other Asian countries such as Vietnam (12 per cent weight-for-age malnutrition; 23 per cent stunting) and China (3.4 per cent weight-for-age malnutrition; 9.4 per cent stunting).

SMPs may also have significant economic impacts. The programs have potential for better linking smallholders to 'reliable' consumers for example through contract arrangements. Given the number of school-aged children in Indonesia, the potential is huge. Yet, there has not been any comprehensive (published) studies estimating this potential.

5. Methods

5.1. Survey

As previously mentioned, first, the study collected information about existing government programs by interviewing relevant government bodies' officials (e.g. Ministry of Agriculture, Ministry of Trade, district education offices (Dinas Pendidikan), district livestock offices (Dinas Peternakan), etc).[4] Results from these initial interviews suggested two key points: i) SMPs in Indonesia are not well-documented and the 'main' program (i.e. PMT-AS) no longer exists; and ii) initial information about the MAS model. Whilst the initial plan of this study was to look at government-run SMPs; given the absence of ongoing government-run SMPs, we decided to focus on the MAS model with an aim of exploring a possibility to scale out and scale up such a program.

Sample respondents were selected from primary school students in Sukabumi city and Sukabumi municipality. The total number of students included in this survey was determined using the following formula:

$$n = \frac{N}{1 + Ne^2}$$

Where n =sample size; N =total number of primary school students in Sukabumi city and Sukabumi municipality; and e =desired margin of error. According to the West Java provincial government, in 2012 total numbers of primary school students in Sukabumi city and Sukabumi municipality were 33,822 and 270,941 respectively (West Java Provincial Government 2012). Based on a desired margin of error of 5.5%, we targeted to survey 100 students in each of the six schools that we visited with an aim of interviewing all Year 5 and Year 6 students. Due to variations between the numbers of students in each school, however, the actual split between city and municipality sample was not exactly as planned although it was still close to a 50-50 split.

Between 18 and 25 October 2014, school-based surveys and interviews with school principals or their proxies were conducted. In each of the two regions, we purposively chose 2 SMP-schools (i.e. schools that are having a contract with MAS) and 1 non-SMP school as a control. We conducted interviews

[4] We drafted a semi-structure interview questionnaire addressing the following aspects: program profiles (year started, aims, administrators, funding agency and participants); socialisation or communication strategies; links with other government programs (e.g. poverty reduction programs); support from other government bodies; targeting schemes (recipients' selection criteria, distribution, sources of milk products (e.g from local suppliers), and the role of local institutions) and ongoing monitoring and evaluation studies that have been implemented including key performance indicators, impacts and existing cost-benefit analysis.

with school principals and can confirm that none of the 'control' schools has ever heard about the MAS school milk program.

Table 3 summarises the survey design. From each school, we interviewed all students in Year 5 and Year 6. If the number of Year 5 and Year 6 students were below 100, we interviewed Year 4 students. Given a limited budget, a self-administered questionnaire-based survey must be conducted and this requires respondents who can read and write. This explains why we chose Year 4, Year 5 and Year 6 students. Three experienced enumerators including a lead enumerator were present in the classroom to help students who didn't understand the survey questions.

The students were advised by the enumerators that the objectives of the questions being asked were to know foods they eat at home and at school and what they know about dairy products. The enumerators clearly mentioned to students that: i) the survey was not a test and there were no right or wrong answers; ii) they should be honest and not discuss the questions with their friends; iii) as a confidential statement, their answers would be kept private and no one would ever know what they say unless they told them; iv) they can ask the enumerator if they did not understand the questions. These statements were also put on the cover page of the questionnaire. In total, the analysis in Section 5 uses data from 582 students.

5.2. Questionnaire and approaches to measure students' WTP

The student-administered questionnaire was carefully designed to allow respondents to accurately understand our questions and be able to explain their socio-economic characteristics; their food as well as dairy consumption behaviours; and WTP and other factors that might affect their diet. The questionnaire was pre-tested to a group of primary school students comparable with target respondents. The pre-test was conducted in Bogor, West Java.

The final questionnaire consisted of six parts. The first part contained questions about students' individual and household socio economic characteristics. Given the budget limitations, we did not visit these students' parents and, therefore, asked the students to help us define their household's socio-economic background by defining: the number of householders, the number of rooms, household ownership of/access to various items (e.g electricity, in-house toilet, television, fridge, motorbike, car, air conditioner, computer/laptop), and type of flooring at their house. We also asked their gender, age, number of absent days due to illness and travel time from their house to school.

The second part of the final questionnaire asked about students' food consumption. The students were asked about the consumption of vegetables, fruits and rice i.e. whether they consumed these items yesterday and if yes, what the frequency of the consumption. They were also asked other behavioural questions such as the frequency of watching television. Existing studies suggest that television viewing have association with Body Mass Index in younger children (Dietz and Gortmaker 1985; Coon *et al.* 2001; Matheson *et al.* 2004). Four questions were asked to determine students' food security status. These questions were adopted from a study by Rivers *et.al* (2004).[5] The first three questions were asked to all respondents, while the fourth question was asked only if the respondent answered affirmatively to one of the previous three.

1. In the last 30 days, did you ever cut the size of your meals or skip meals because there was not enough food or money to buy food?

[5] Instead of looking at food security status at household level as used in Rivers, et al. (2004), this study looks at students' individual-level food security status.

2. In the last 30 days, did you ever eat less than you felt you should because there was not enough food or money to buy food?
3. In the last 30 days, were you very hungry but did not eat because there was not enough food or money to buy food?
4. Please answer if you have at least one 'Yes' response to the above questions: In the last 30 days, did you ever not eat for the whole day because there was not enough food or money to buy food?

In the third section of the final questionnaire, the students were asked about their food consumption at school. The questions included whether they or their parents packed a lunch box, the frequency of consumption of different types of food and drinks in the past 7 days. We divided the food and beverages items into the following categories: savoury snack food; sweets; traditional food; fresh fruits; cordial drinks; drinking water; liquid milk; yoghurt; cheese and 'other'. We provided some examples of the first five categories on the questionnaire and the enumerator was assisting students who could not decide the type of a particular food/drink that they consumed. A previous study suggests that dietary intake of rural children in West Java is highly dependent on snack foods consumption, represented by 40 per cent contribution to total energy intake (Sekiyama *et al.* 2012). In addition to getting a better understanding of their diets, questions on their school snack consumption are also important to better understand students' preferences subject to budget constraints.

The fourth section of the final questionnaire asked some specific questions about their dairy consumption, including the consumption frequency in the past 7 days and in the past 1 month; whether they started drinking milk since Year 1 or Year 2 and so on; and their parents' dairy consumption behaviours. We also asked about the types of products they consumed e.g. condensed milk, fresh milk, etc. A particular concern is over sweetened condensed milk. Whilst demand for fresh milk is expected to continue to increase, sweetened condensed milk's market share remains high at 35 per cent, compared to shares of fluid UHT milk and powder milk at 26 per cent and 39 per cent, respectively (USDA 2013).

The fifth section of the final questionnaire asked about students' pocket money, including whether they received any, the frequency, the amount, the allocation and how they spent it. We specifically asked whether they're able to save their pocket money (and they can choose to answer that they don't have enough money to save; or don't know).

At the end of the questionnaire, students were asked three IQ-test type of questions to proxy their cognitive skills. They were asked to answer what the next number in the following sequences: i) 1, 4, 9, 16, … ; ii) 3, 5, 8, 13, … ; and iii) 2, 6, 12, 20, 30 … . A pilot test suggests that these questions can differ between high-performing students, average and low-performing students.

5.3. Willingness to pay (WTP)

The last part of the fifth section was to ask about students' willingness to pay using a 'direct stated preference' approach. There are limitations of directly asking students as consumers about their WTP. First, they might not have an incentive to reveal their true WTP and quite often overstate their stated WTP because of 'prestige effect'. In contrast, there could be a case where they understate their stated WTP with the hope of getting some subsidised or low price or even free products in the future.

Second, even when they reveal their true WTP, this doesn't necessarily translate into real purchasing behaviours. The main concern is that whether the stated WTP was indeed payable. This issue has been addressed by a study on WTP for public health services in rural Central Java (Shono *et al.* 2014).

They suggested the use of additional questions asking the price the respondent could pay without incurring any debts or as they call "WTPpayable".

Whilst this present study didn't include such a question (as getting debts to allow consumption was slightly irrelevant to the context of school milk program being focussed by this study), this study is able to assess whether the students' WTP is within their budget constraints i.e. amount of pocket money. A series of questionnaire pilot tests also suggest that understanding questions about WTP can be cognitively challenging. The inclusion of a proxy for students' cognitive skills is therefore imperative.

We asked the students: "Would you buy 125 ml of fresh milk if it was priced at Rp x?" where x =500, 1000, 2000 and 3000. The question was presented in a table that can be easily understood by students. The price being asked represented different levels of subsidies. The market price of 125 ml of milk is Rp 2,000. Therefore, the price levels being asked indicate: 75%-subsidised; 50%-subsidised, no-subsidy and premium price, respectively. For each of the price levels (i.e. x), students were asked to tick one of the options: "Yes, I would buy and consume it", or: "No, I wouldn't buy it".

Given the setting of the survey, where students were guided by a lead enumerator in the classroom setting; there was a possibility that students overstated their pocket money as they did not want to be seen by their classmates as someone who's coming from low-socio economic background. We minimised this possibility by ensuring that students were responding to questions independently and did not allow them to see answers made by and discussed with other students.

Post-survey descriptive analysis suggests that the average amount of pocket money of student respondents at. Rp 6500/day is reasonable. A study in Bogor, West Java that has a higher GPD per capita level than Sukabumi regions suggests that the average of pocket money of students aged between 9 and 12 is Rp 150,000/month or approximately Rp 7,500/day (Briawan *et al.* 2011). Another study in Bogor to students aged between 9 and 14 suggests that 88 per cent of its respondents reported daily pocket money between Rp 2,800 and Rp 7,200 (FEMA IPB 2014).

5.4. Descriptive statistics

Table 5 presents descriptive statistics. There are several differences between participating and non-participating schools. Students at participating school are less likely to walk to school than students at non-participating schools. This variable is important to determine their purchasing power as many of these students have to use their pocket money to pay transport to school. Several variables on household assets ownership (e.g. television, fridge, motorbike, car, air conditioner, laptop) as well as the type of floor and parental educational background indicate that students at participating schools are coming from higher income families than those at non-participating schools. Parents of students at participating schools are more likely to consume milk regularly. Table 6 presents students' food and dairy consumption. Some statistically significant differences are the propensities of students frequently consuming fruits and rice (i.e. more than three times a day) that are higher for students at participating schools. In terms of food security status, there is no significant difference between participating and non-participating schools. It is very concerning to see that only a small portion of students at both participating and non-participating schools who regularly bring a lunchbox to school.

Table 7 specifically looks at students' dairy consumption. Generally, students at participating schools purchased dairy products such as yoghurt and cheese more frequently than students at non-participating schools. They are also more likely to consume liquid milk including fresh milk and UHT milk on daily basis. In regard to types of milk being consumed (students were allowed to choose more

than one), it is concerning to see that majority of students are consuming sweetened condensed milk and less than 20 per cent are consuming fresh milk. A lower percentage of students at participating schools who consume sweetened condensed milk might reflect their better awareness of the nutritional content in various dairy products.

Table 8 presents students' WTP and pocket money. There is a significant difference in WTP for 125 ml of fresh milk between students in participating and non-participating schools. The WTP is approximately between IDR 2,000 and 2,500 which is equivalent to the market price of 125 ml UHT milk. Students at participating schools get significantly higher daily pocket money. The difference might reflect different socio-economic status as well as higher money being given by their parents to cover the purchase of dairy products as part of the SMP program. In terms of pocket money allocation, students spend about a half of their pocket money on food; then followed by dairy products and mobile phone voucher. There is no significant difference in pocket money allocation between students at participating and non-participating schools despite their difference in the daily amount of pocket money.

6. Empirical analysis

6.1. Students' Willingness To Pay (WTP)

6.1.1. Baseline model

The categorical and ordinal nature of the WTP data warrants the use of an ordered response model. Hence, this study defines an ordered probit model.[6] Let W^* be a continuous unobserved latent response variable related to the categorical WTP indicating the strength of a student's preference for fresh milk. The latent regression model is given by:

$$WTP_i^* = \beta' X_i + \epsilon_i, \qquad \epsilon_i \sim N(0, \sigma^2) \tag{1}$$

where X_i is a vector of explanatory variables that are potentially affecting WTP; β is a vector of parameter associated with the X_i and ϵ_i is the error term.

While the latent variable (WTP^*) is not observed, the ordinal variable (WTP_i) selected by student is known. The probability that a respondent would choose the j-th category of WTP is given by:

$$\begin{aligned} \Pr\left(WTP_i = \frac{j}{X_i}\right) &= \Pr\left(\epsilon_i < \mu_j - \frac{\beta' X_i}{X_i}\right) - \Pr\left(\epsilon_i > \mu_{j-1} - \frac{\beta' X_i}{X_i}\right) \\ &= \Phi(\mu_j - \beta' X_i) - \Phi(\mu_{j-1} - \beta' X_i) \qquad (2) \\ & j = 1,2,3,4; \end{aligned}$$

[6] As pointed by many studies, while the use of an ordered probit model is relevant to the nature of WTP variables being captured from the survey; if there were a significant portion of zero responses (i.e. students who are not willing to purchase milk), an alternative econometric model might be needed. The students might make two joint decisions: i) whether or not to buy; and ii) how much to pay. This 'two-stage' decision process modelling has been widely used by previous studies including the Heckman selection model and the Cragg model. Some more recent studies have applied the ordered probit model with sample selection (for example Huang, et al. (1999) and Moon, et al. (2002)). However, closely looking at the dataset used in this study, all of the respondents stated a positive value of WTP. Hence, there is no significant concern about whether or not they are willing to pay for fresh milk.

Where the dependent variable is ordinal variables representing the level the student indicated she or he believed would an available daily amount of pocket money to pay for milk at school; $\mu_{1\ldots4}$ are unknown parameters to be estimated along with β and Φ denotes the standard normal cumulative distribution function (CDF) and j determined by the number of WTP categories.

Columns (i) to (iv) in Table 9 present results from the ordered probit model to look at the determinants of WTP. We gradually add more sets of explanatory variables in the analysis. There are only few significant variables. A dummy on whether the student walks to school is significantly and negatively associated with their WTP. These students might have less 'financial freedom' in terms of deciding what they can spend on their pocket money. This might restrict them toreport a higher WTP. This argument is aligned with the significance of daily pocket money. Student with higher pocket money are more likely to report a higher WTP. In addition, students from higher income families as indicated by the ownership of air conditioner are more likely to report higher WTP.

Parents' dairy consumption behaviour is positively associated with students' WTP. Whilst understanding the exact reason why parents' milk consumption matters for children's milk consumption is beyond the scope of this study, preliminary discussions with school administrators and MAS representatives suggest that parents play a significant role in whether or not schools agree to have a contract with MAS. There is a possibility that parents who drink milk regularly at home are more concerned about their students' diet and teach their children the importance of milk consumption, and, therefore, support the school to join in a contract with MAS. This might motivate their children to value milk consumption more than children of parents who do not consume milk on a regular basis. In addition, column (iv) of Table 9 suggests that attendance at a school located in an urban area is positively associated with WTP.

6.1.2. Endogenous SMP participation variable

The above section assumes that all explanatory variables are exogenous. It is likely that a dummy on school participation at milk program is endogenous. A student in a participating school may be more willing to spend at least the amount of money they already pay every week for the milk product being distributed at SMPs (i.e. Rp 1,000 or approximately US$0.10). There is a possibility that some unobservable factors might impact both SMP participation and WTP. Students in participating schools might have better awareness of the importance of dairy consumption and therefore would state higher WTP. In this case, OLS would yield a positive coefficient on SMP participation even if the attendance at a participating school has no causal effect on WTP.

Given the above background, this study defines two equations relating to the latent variable related to student's WTP (WTP^*) and SMP^*, an unobserved variable relating to the school's participation at SMPs. The observed variable is a dummy which equals to one if the school is participating at SMPs i.e. SMP school.

$$SMP_i^* = \gamma' Z_i + v_i, \qquad v_i \sim N(0, \sigma_v^2) \tag{3}$$

$$WTP_i^* = \alpha_1 SMP_i^* + \beta_2' \bar{X}_i + u_i, \qquad u_i \sim N(0, \sigma_u^2) \tag{4}$$

Where $\bar{X}_i$ is a vector X as in Sub-section 5.1.1 excluding a dummy on school participation at SMP and u_i is the error that follows a normal distribution. The first stage equation requires the inclusion of an additional exogenous variable that is not included in the second stage equation. The instrument must

be able to explain variations in school participation at SMP (i.e. the relevance condition) but must not be correlated with omitted variables that may affect students' WTP (i.e. the exclusion restriction).

First, the MAS cooperative management staff explained that the distribution of SMPs has given a priority to schools in isolated areas. They argued that students at these schools have more limited access to dairy products. Therefore, we chose distance between the school and MAS as an instrument. We expect that the coefficient on this variable is positive. We argue that our instrument is exogenous. All of the primary schools being surveyed were established long before the MAS cooperative started its operation in 2011.

Second, we argue that distance between the school and MAS is not correlated with omitted variables that may affect WTP (i.e. exclusion restriction). The MAS never directly sells to individual consumers and its location is not necessarily located in an area where dairy production is well-concentrated. Thus, distance to MAS is not necessarily associated with better access to fresh milk and more exposure to dairy products, which may increase the propensity of reporting a higher WTP.

Column (v) of Table 9 presents the results from the ordered probit with endogenous regressor. The first stage equation on the determinants of participation at school milk programs suggests that coefficients on household asset ownership such as television, fridge; mother's and father's education are positively associated with participation at SMPs.[7] The instrument i.e. distance to MAS is positively associated with school participation at milk programs at 5 per cent level of significance.

In regard to the second stage equation, overall, Columns (iv) and (v) of Table 9 suggest similar results. Walking to school (negatively), higher income households as proxied by ownership of air-conditioner (positively), and parental milk consumption behaviour (positively) are associated with WTP. The endogenous dummy on SMP participant, however, remains insignificant. The insignificance of a coefficient on SMP participation by no means suggests that the SMP has no *effect* on participating students. To assess the impacts of SMP participation, the next section looks at health and cognitive skills measures. The insignificance, however, may indicate that other factors such as socio-economic status and family's milk consumption behaviours may be more dominant in explaining variations in WTP. This insignificance may imply that transitions to higher value dairy products (from example from a small yoghurt stick that costs US$0.10 to 250 ml of pasteurised milk that costs US$1.00) in participating schools may require more socialisation programs. But, again, this is conditional on students' ability to pay that is reflected by their daily pocket money and their family's socio-economic background. Further investigation into students' purchasing power will help identify rationale for public and private interventions.

6.2. Impacts on health

Next, this study looks at the impact of school milk program participation on health measures. We choose four dependent variables: Body Mass Index (BMI), BMI z-scores, weight-for-age z-scores (WAZ), and height-for-age z-scores (HAZ). BMI is calculated using each individual's weight (kilograms) divided by height squared (metres^2). To calculate BMI, weight-for-age and height-for-age z-scores, group means and standard deviations are obtained from the United States Centre for Disease

[7] The complete table is not presented here but can be obtained from the authors.

Control (US CDC) Growth Charts in 2000.[8] The use of the charts as reference allows this study to compare its results with other studies.

The equation is defined as follows:

$$H_i = \alpha_2 SMP_i + \beta_3' \overline{X_{2i}} + w_i, \qquad w_i \sim N(0, \sigma_w^2) \qquad (5)$$

Where H_i is one of the four health outcome variables. SMP_i denotes a dummy on school milk program participation. $\overline{X_{2i}}$ is a vector of explanatory variables excluding SMP participation. Given the endogeneity of the SMP variable, we perform an instrumental variable (IV) model and define the first stage equation as in Equation (3).

This study refers to the BMI cut-off points endorsed by the World Health Organization (WHO): BMI<25 for normal weight; BMI 25-29.99 for overweight and BMI>30 for obese. Table 10 suggests that over 60 per cent of respondents in both participating and non-participating schools have normal weight. Our analysis to look at the determinants of health outcomes includes child characteristics such as gender, age (and its square); family's socio-economic background and parental age and educational background and school milk program participation as in the previous section. We also add several variables to take into account dairy consumption (e.g. types of dairy products and frequency of milk consumption), food consumption behaviours such as a dummy on whether the student brings a lunch box, the duration of television viewing, amount and percentage of pocket money spent on food items. Students from medium to high socio-economic background (thus, might have more pocket money) might gain benefits from higher food and health expenditure, which may in turn be related to health status. The list of variables being included is similar to those of previous studies subject to data availability (Krassas *et al.* ; Sturm and Datar 2005; Umberger *et al.* 2015).

Table 11 presents the IV results. It can be seen that school milk program participation is significantly associated with WAZ and HAZ. The results are consistent with other studies, for example Lien *et. al.* (2009) who suggest that milk intervention has improved WAZ and HAZ significantly at 5 per cent level of significance. Other significant variables are: (i) being male (negatively), which is significant in all four columns; (ii) number of household members (negatively), significantly associated with WAZ and HAZ; (iii) amount of daily pocket money, which is significant in all columns except for WAZ; (iv) the ownership of air conditioner (positively) which reflects student's socio-economic background and is associated significantly with BMI and WAZ. Although most of the variables being included are insignificant, the significant variables have expected signs. For example, similar to Umberger *et al.* (2015) students from larger families as indicated by the number of household members tend to have lower WAZ and HAZ since there might be less household budget allocated to their health and food consumption.

It is interesting to note that after controlling other covariates including school milk program participation, none of dairy consumption-related variables is significant. Note that these variables refer to students' dairy consumption *at home*. The insignificance of the variables may be due to irregularity of their consumption (and perhaps the quantity and quality of dairy products, but we were unable to capture these aspects). According to descriptive statistics, on average, in the week prior to the survey date students consumed milk only three times a week. What is even more concerning is that more than 50 per cent of these students do not consume milk regularly, which means the average could have been even lower if the average was taken from a longer period. In such as circumstance,

[8] This study uses STATA statistical software' additional function for 'egen' as developed by Vidmar, et al. (2004).

the school milk program would make an impact as it can at least ensure that students consume milk once a week, can be vital.

7. Concluding remarks

This study has been motivated by huge interest in providing policy recommendations on improving the design and distribution of school milk programs local and evaluating the effectiveness of school milk programs in addressing market failures in dairy sectors as well as potential investment opportunities for local and foreign direct investments. Past implementation of school milk programs in Indonesia was not very pleasing but it is still widely believed that school milk program have a lot of potentials and important for achieving not only nutritional objectives but also improved academic attainment.

Using a small dairy cooperative (MAS) – run and student-self funded school milk program in Sukabumi, Indonesia as a case study, this study finds preliminary evidence on the health impacts of participation at school milk programs. To solve the issue of endogenous program participation, the study uses distance between MAS and the school as an instrument. When accounting for this endogeneity, school milk program participation is found to have an impact of height-for-age and weight-for-age z-scores. The regularity of the program that is ensured by a contract between the school and the producer (i.e. MAS) may play a role in explaining this significant impact. Looking at student's Willingness-to-Pay (WTP), this study observes that most students are willing to pay between Rp 2,000 and Rp 2,500 a week (or between US$0.20 and US$0.25 a week). Student's socio-economic background and parental milk consumption behaviour are significantly associated with students' WTP. The average of students' WTP can indicate rationale for public and private intervention. In a region like Sukabumi, self-funded school milk program may only mean a once a week dairy product (i.e. a pack of 125 ml fresh milk) delivery. Considering their low milk consumption behaviours at home (and potentially poor quality of products they consume), more frequent delivery and more nutritious dairy products (e.g. shifting from consumption of yoghurt stick to pasteurised milk) is suggested. Obviously, this will bring implications for not only budget but also supply chains.

Our study has limitations that deserve mention. Our respondent-administered survey might affect the quality of datasets that we obtained. However, giving a particular attention to results on WTP, we observed that 95% of those Year 4, 5 and Year 6 students were able to state WTP that is within their budget constraints. Despite potential limitations, our findings contribute novel information to our understanding of students' perspectives of school milk programs. The results reported here can be used to calculate cost-effectiveness analysis of the scaling up program of school milk programs, which should be the direction of future studies.

References

Abramovitch, R., Freedman, J.L. and Pliner, P. (1991). Children and money: getting an allowance, credit versus cash, and knowledge of pricing∗, *Journal of Economic Psychology* 12, 27-45.

Afridi, F. (2010). Child welfare programs and child nutrition: Evidence from a mandated school meal program in India, *Journal of Development Economics* 92, 152-165.

Alderman, H.J.R.L.V.R. (2001). Child Health And School Enrollment, *Journal of Human Resources* 36, 185-205.

Aturupane, H., Glewwe, P. and Wisniewski, S. (2011). The impact of school quality, socioeconomic factors, and child health on students' academic performance: evidence from Sri Lankan primary schools, *Education Economics* 21, 2-37.

Barnet-Verzat, C. and Wolff, F.-C. (2002). Motives for pocket money allowance and family incentives, *Journal of Economic Psychology* 23, 339-366.

Briawan, D., Rachma, P. and Annisa, K. (2011). Kebiasaan konsumsi minuman dan asupan cairan pada anak usia sekolah di perkotaan (Beverage consumption behaviours of school aged children in urban areas), *Journal of Nutrition and Food* 6, 186-191.

Bryans, J. (2013). School milk programmes: A joint FAO/IDF global review, 2014(Available from URL: http://www.fao.org/fileadmin/templates/est/COMM_MARKETS_MONITORING/Dairy/Documents/Judith_Bryans_presentation_at_IDF_WDS_2013_Japan.pdf

Chen, C.L., Kuppermann, M., Caughey, A.B. and Zane, L.T. (2008). A community-based study of acne-related health preferences in adolescents, *Archives of Dermatology* 144, 988-994.

Coon, K.A., Goldberg, J., Rogers, B.L. and Tucker, K.L. (2001). Relationships Between Use of Television During Meals and Children's Food Consumption Patterns, *Pediatrics* 107, e7.

Cox, B. and Sneyd, M.J. (2011). School Milk and Risk of Colorectal Cancer: A National Case-Control Study, *American Journal of Epidemiology* 173, 394-403.

Dietz, W.H., Jr. and Gortmaker, S.L. (1985). Do We Fatten Our Children at the Television Set? Obesity and Television Viewing in Children and Adolescents, *Pediatrics* 75, 807-812.

Erwidodo and Trewin, R. (1996). The Social Welfare Impact of Indonesian Dairy Policies, *Bulletin of Indonesian Economic Studies* 32, 55-84.

Fabiosa, J.F. (2005). Growing demand for animal-protein-source products in Indonesia: trade implications, Center for Agricultural and Rural Development, Iowa State University. Available from URL: http://www2.econ.iastate.edu/research/webpapers/paper_12393.pdf

FAO (2012). FAOSTAT, Food Agricultural Statistics (FAO). Available from URL: http://faostat3.fao.org/home/index.html

FAO (2013). FAOSTAT, Food Agricultural Statistics (FAO). Available from URL: http://faostat3.fao.org/home/index.html

FAO; IFAD and WFP (2014). The State of Food Insecurity in the World 2014: Strengthening the enabling environment for food security and nutrition, FAO, 2014(Available from URL: http://www.fao.org/3/a-i4030e.pdf

FEMA IPB (2014). Kebiasaan jajan siswa sekolah dasar (Primary school student at-school consumption behaviours), FEMA IPB, 2014(Available from URL: http://fema.ipb.ac.id/index.php/kebiasaan-jajan-siswa-sekolah-dasar/

Furnham, A. (1999). Economic socialization: A study of adults' perceptions and uses of allowances (pocket money) to educate children, *British Journal of Developmental Psychology* 17, 585-604.

Furnham, A. and Thomas, P. (1984). Pocket money: A study of economic education, *British Journal of Developmental Psychology* 2, 205-212.

Glewwe, P., Jacoby, H.G. and King, E.M. (2001). Early childhood nutrition and academic achievement: a longitudinal analysis, *Journal of Public Economics* 81, 345-368.

Griffin, M. (2005). Overview of worldwide school milk programmes, 2014(Available from URL: http://www.fao.org/fileadmin/templates/est/COMM_MARKETS_MONITORING/Dairy/Documents/Overview_of_worldwide_school_milk_programmes.pdf

IDF and FAO (2013). Milk in schools questionnaire, Food and Agriculture Organization (FAO), 2014(Available from URL: http://www.fao.org/fileadmin/templates/est/COMM_MARKETS_MONITORING/Dairy/Documents/Finalized_School_Milk_Survey_130225.pdf

Jabbar, M.A. and Ahuja, V. (2011). *Linking school milk with smallholder dairy development: Thai experience and design considerations for a pilot project in Bangladesh*. The Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific, Bangkok, Thailand.

Jomaa, L.H., McDonnell, E. and Probart, C. (2011). School feeding programs in developing countries: impacts on children's health and educational outcomes, *Nutrition Reviews* 69, 83-98.

Krassas, G.E., Tzotzas T Fau - Tsametis, C., Tsametis C Fau - Konstantinidis, T. and Konstantinidis, T. Determinants of body mass index in Greek children and adolescents.

Lien, D.T.K., Nhung, B.T., Khan, N.C., Hop, L.T., Nga, N.T.Q., Hung, N.T., Kiers, J., Shigeru, Y. and te Biesebeke, R. (2009). Impact of milk consumption on performance and health of primary school children in rural Vietnam, *Asia Pacific journal of clinical nutrition* 18, 326.

Matheson, D.M., Killen, J.D., Wang, Y., Varady, A. and Robinson, T.N. (2004). Children's food consumption during television viewing, *American Journal of Clinical Nutrition* 79, 1088-1094.

Morey, P. (2011). Dairy Industri Development in Indonesia, International Finance Corporation. Available from URL: http://www1.ifc.org/wps/wcm/connect/93f48d00470e3bf883ffd7b2572104ea/Dairy+Industry+Development-2011.pdf?MOD=AJPERES

Okada, T. (2004). Effect of cow milk consumption on longitudinal height gain in children, *Am J Clin Nutr.* 80, 1089-1090.

Otsuki, K. and Arce, A. (2007). Brazil: A desk review of the National School Feeding Programme, WFP, 2014(Available from URL: http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp207419.pdf

Priyanti, A., Rindayanti, W. and Rumagit, G.A.J. (2004). Dampak Penerapan Kebijakan Industry Susu Terhadap Kesejahteraan Masyarakat, Indonesian Center for Animal Research and Development. Available from URL: http://peternakan.litbang.deptan.go.id/fullteks/wartazoa/wazo142-6.pdf

Rahmani, K., Djazayery, A., Habibi, M.I., Heidari, H., Dorosti-Motlagh, A.R., Pourshahriari, M. and Azadbakht, L. (2011). Effects of daily milk supplementation on improving the physical and mental function as well as school performance among children: results from a school feeding program, *Journal of Research in Medical Sciences : The Official Journal of Isfahan University of Medical Sciences* 16, 469-476.

Riethmuller, P., Chai, J., Smith, D., Hutabarat, B., Sayaka, B. and Yusdja, Y. (1999). The mixing ratio in the Indonesian dairy industry, *Agricultural Economics* 20, 51-56.

Scott, A. and Lewis, A. (2000). The economic awareness, knowledge and pocket money practices of a sample of UK adolescents: A study of economic socialisation and economic psychology, *Citizenship, Social and Economics Education* 4, 34-46.

Sekiyama, M., Roosita, K. and Ohtsuka, R. (2012). Snack foods consumption contributes to poor nutrition of rural children in West Java, Indonesia, *Asian Pacific Journal of Clinical Nutrition* 21, 558-567.

Shono, A., Kondo, M., Ohmae, H. and Okubo, I. (2014). Willingness to pay for public health services in rural Central Java, Indonesia: Methodological considerations when using the contingent valuation method, *Social Science & Medicine* 110, 31-40.

Stifel, D. and Alderman, H. (2006). The “Glass of Milk” Subsidy Program and Malnutrition in Peru, *The World Bank Economic Review* 20, 421-448.

Sturm, R. and Datar, A. (2005). Body mass index in elementary school children, metropolitan area food prices and food outlet density, *Public Health* 119, 1059-1068.

Umberger, W.J., He, X., Minot, N. and Toiba, H. (2015). Examining the Relationship between the Use of Supermarkets and Over-nutrition in Indonesia, *American Journal of Agricultural Economics*aau111.

USDA (2013). Indonesia: Dairy and products annual 2013, USDA 2014(Available from URL: http://www.fas.usda.gov/data/indonesia-dairy-and-products-annual-2013

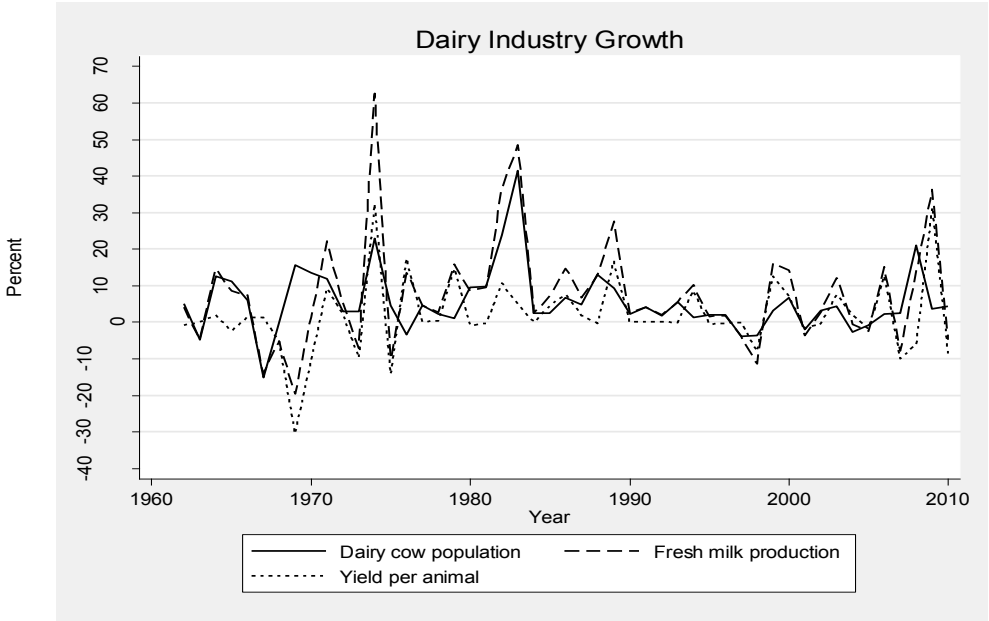
West Java Provincial Government (2012). Jawa Barat Dalam Angka (Jawa Barat in Figure) 2012, West Java Provincial Government,, 2014(Available from URL: http://www.jabarprov.go.id/root/dalamangka/dda2012.pdf

WFP (2008). 2008 Figures on WFP School Feeding Programmes, WFP, 2014(Available from URL: http://home.wfp.org/stellent/groups/public/documents/communications/wfp205343.pdf

World Bank (2014). World Development Indicator Online, The World Bank. Available from URL: http://data.worldbank.org/data-catalog/world-development-indicators

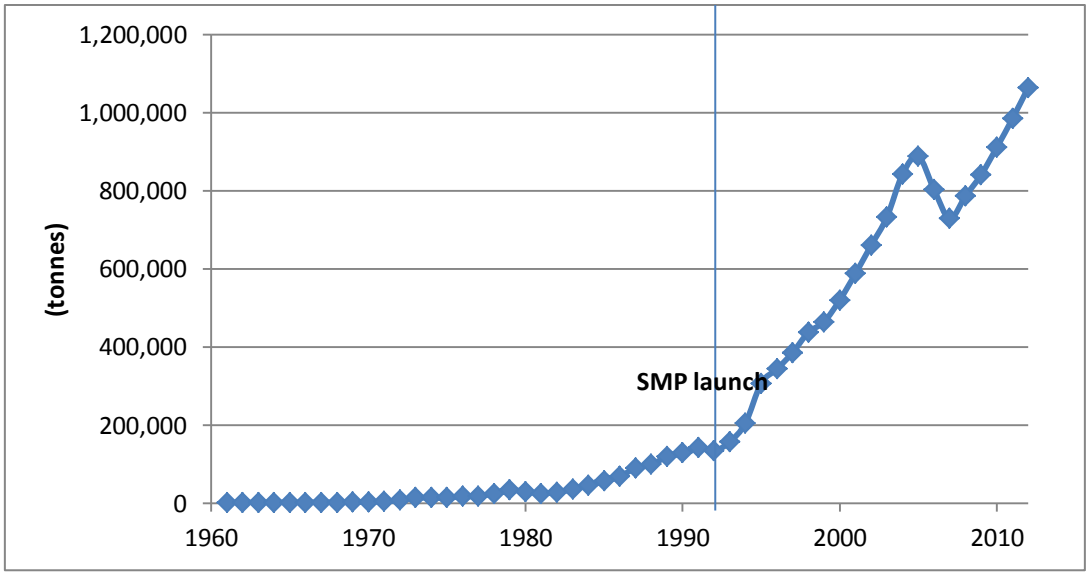
Zhu, K., Du, X., Cowell, C.T., Greenfield, H., Blades, B., Dobbins, T.A., Zhang, Q. and Fraser, D.R. (2005). Effects of school milk intervention on cortical bone accretion and indicators relevant to bone metabolism in Chinese girls aged 10–12 y in Beijing, *The American Journal of Clinical Nutrition* 81, 1168-1175.

Figure 1. Dairy industry growth in Indonesia, 1960-2010



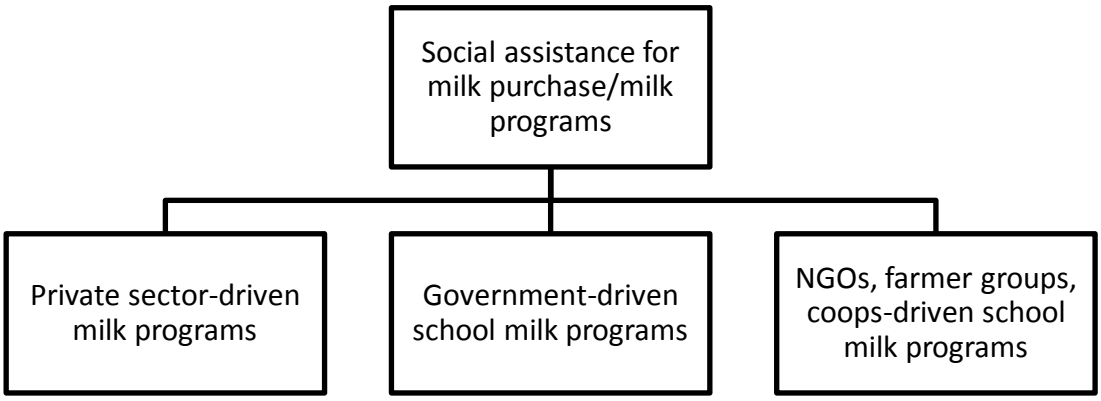
Source: FAO Statistics (FAO 2013)

Figure 2. Annual production of fresh cow's milk in Thailand, 1961-2012



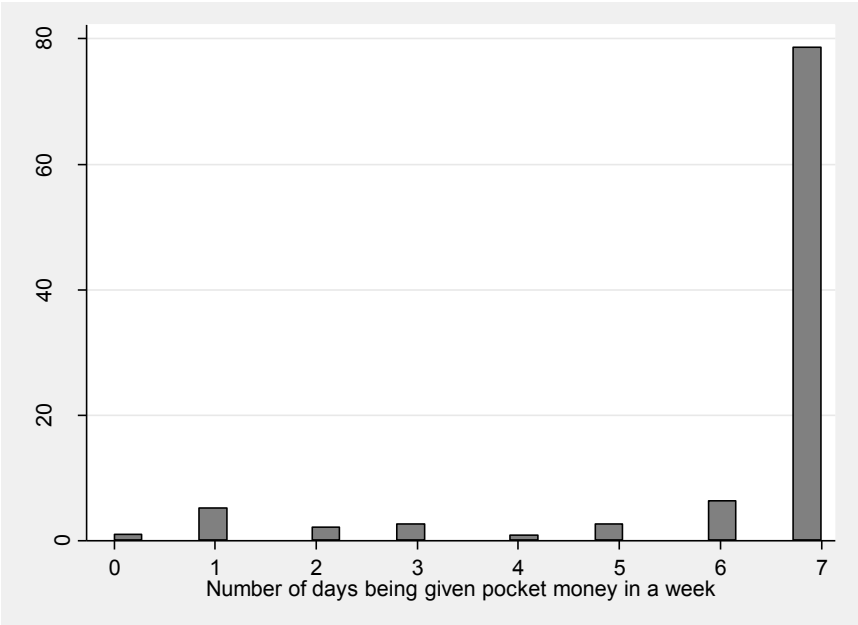
Source: FAO Statistics (FAO 2013)

Figure 3. Overview of milk programs in Indonesia



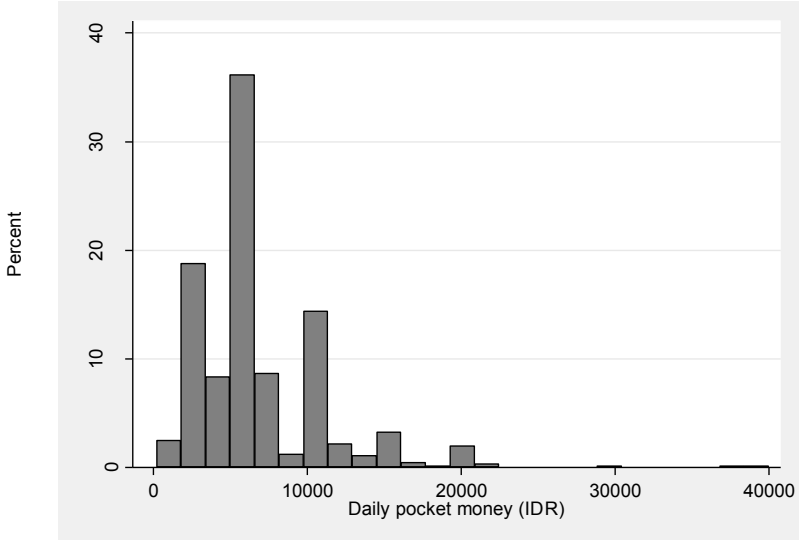
Source: Authors' compilation

Figure 4. Number of days being given pocket money



Source: Authors' calculation based on survey data.

Figure 5. Average of students' daily pocket money (in IDR)



Source: Authors' calculation based on survey data.

Notes: As of December 2014, US$1 is equivalent to approximately IDR 10,000.

Table 1. Objectives of school feeding program in Bangladesh

Education	Health	School management and facilities/services
• Increase school enrollment and attendance by providing supplementary food as an incentive • Reduce school repetition and dropout rates • Improve attention and learning capacity by reducing short-term hunger • Improve school achievement	• Improve nutritional status and health by reducing micronutrient deficiencies and providing a protein/calorie supplement	• To encourage schools to provide water from tested, arsenic-free tube wells • To provide separate toilet facilities for girls as the lack of such facilities was viewed as a potential barrier to girls' school enrolment. • To encourage greater participation by women in the school management committee

Note: The program was implemented through distribution of fortified biscuits to primary school student in the targeted schools six days a week during the school year. It provided morning snack consisting of eight fortified wheat biscuits to some one million children in approximately 6,000 primary schools in highly food-insecure rural areas in a number of districts, plus four slum areas in Dhaka City.

Source: Jabbar and Ahuja (2011, page 7)

Table 2. Malnutrition prevalence among children under 5 in Indonesia, 2000-2010

Variable	2000	2004	2007	2010
Malnutrition prevalence, height for age (% of children under 5)	42.4	28.6	40.1	39.2
Malnutrition prevalence, height for age, female (% of children under 5)	41.0	27.4	38.8	37.6
Malnutrition prevalence, height for age, male (% of children under 5)	43.7	29.8	41.3	40.8
Malnutrition prevalence, weight for age (% of children under 5)	24.8	19.7	19.6	18.6
Malnutrition prevalence, weight for age, female (% of children under 5)	23.8	18.7	18.6	15.7
Malnutrition prevalence, weight for age, male (% of children under 5)	25.7	20.7	20.7	19.5

Definition: Prevalence of child malnutrition, weight for age is the percentage of children under age 5 whose weight for age is more than two standard deviations below the median for the international reference population ages 0-59 months. The data are based on the WHO's new child growth standards released in 2006. Prevalence of child malnutrition, height for age is the percentage of children under age 5 whose height for age (stunting) is more than two standard deviations below the median for the international reference population ages 0-59 months. For children up to two years old height is measured by recumbent length. For older children height is measured by stature while standing. The data are based on the WHO's new child growth standards released in 2006.

Source: World Development Indicator (World Bank 2014)

Table 3. Survey design

	Treatment		
	No contract with MAS (ie Control)	**Have a contract with MAS (ie Treatment)**	**Total observations**
Sukabumi city ie. urban areas	School 013 (N=68)	School 111 (N=128); School 112 (N=124); Total=252	320 54.98%
Sukabumi municipality ie. rural areas	School 003 (N=108)	School 101 (N=79); School 102 (N=75); Total=154	262 45.02%
Total observations	176 30.24%	406 69.76%	582

Table 4. Food security status

Questions asked to respondents	**Responses**		
1. 2. 3.	All negative responses	At least 1 affirmative response	At least 1 affirmative response
4.	Not asked	No	Yes
Food security status	*Food secure*	*Food insecurity without hunger*	*Food insecurity with hunger*

Source: Rivers *et.al* (2004)

Table 5. Descriptive statistics

Variables	Non-participating students N= 176	Participating students N=406	Difference
One if the student is in Year 4	0.136	0.047	0.090***
One if the student is in Year 5	0.426	0.473	-0.047
One if the student is in Year 6	0.438	0.480	-0.043
Student's age	11.045	10.951	0.095
One if the student is male	0.568	0.488	0.080
One if the student walks to school	0.955	0.719	0.235***
Number of household members	5.375	5.707	-0.332
Cognitive skill test score	0.841	1.064	-0.223**
One of the bathroom is inside the house	0.852	0.911	-0.059*
One if the household owns at least one television	0.744	0.978	-0.234***
One if the student's household owns at least one fridge	0.364	0.803	-0.439***
One if the student's household owns at least one motorbike	0.563	0.756	-0.194***
One if the student's household owns at least one car	0.119	0.195	-0.075*
One if the household owns air conditioner	0.040	0.064	-0.024
One if the student's household owns at least one computer or laptop	0.131	0.473	-0.342***
One if the house floor is ceramic	0.659	0.855	-0.196***
Father's age	42.119	43.544	-1.425
Father's education			
No schooling	0.006	0.074	-0.068***
Primary education	0.551	0.111	0.440***
Junior secondary school	0.250	0.187	0.063
Senior secondary school	0.182	0.451	-0.269***
Diploma	0.000	0.012	-0.012
University and above	0.011	0.165	-0.154***
Mother's age	36.34	39.00	-2.662***
Mother's education			
No schooling	0.034	0.064	-0.030
Primary education	0.551	0.148	0.403***
Junior secondary school	0.256	0.182	0.073*
Senior secondary school	0.148	0.473	-0.325***
Diploma	0.000	0.015	-0.015
University and above	0.011	0.118	-0.107***
One if parents consume milk every day or almost everyday	0.040	0.113	-0.074**
One if the school is in Sukabumi city	0.386	0.621	-0.234***

*Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.*

Table 6. Food and dairy consumption behaviours

Categories	Variables	Non-participating students N= 176	Participating students N=406	Difference
Vegetable consumption: Yesterday, did you eat any vegetables?	One if the student did not eat any vegetables	0.324	0.335	-0.011
	One if the student ate vegetables 1 time yesterday	0.278	0.271	0.007
	One if the student ate vegetables 2 times yesterday	0.244	0.239	0.005
	One if the student ate vegetables 3 or more times yesterday	0.153	0.155	-0.002
Fruit consumption: Yesterday, did you eat any fruits?	One if the student did not eat any fruits	0.394	0.264	0.130**
	One if the student ate fruits 1 time yesterday	0.349	0.343	0.005
	One if the student ate fruits 2 times yesterday	0.183	0.200	-0.017
	One if the student ate fruits 3 or more times yesterday	0.074	0.193	-0.118***
Rice consumption: Yesterday, did you eat any rice?	One if the student did not eat any rice	0.023	0.010	0.013
	One if the student ate rice 1 time yesterday	0.069	0.059	0.010
	One if the student ate rice 2 times yesterday	0.552	0.354	0.198***
	One if the student ate rice 3 or more times yesterday	0.356	0.577	-0.220***
Food security status	Food insecure with hunger	0.000	0.002	-0.002
	Food insecure without hunger	0.205	0.236	-0.032
	Food secure	0.795	0.761	0.034
Lunchbox: In the past 7 days, did you take food to school?	One if 'Always'	0.006	0.022	-0.017
	One if 'Often'	0.011	0.015	-0.003
	One if 'Occasionally'	0.420	0.444	-0.025
	One if 'Rarely'	0.121	0.243	-0.122***
	One if 'Never'	0.443	0.275	0.167***

*Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.*

Table 7.Students' dairy consumption

Categories	Variables	Non-participating students N= 176	Participating students N=406	Difference
Purchase from the school canteen/or sellers/shops near the school in the past 7 days: Liquid milk	No purchase	0.236	0.139	0.097**
	1 time	0.282	0.305	-0.024
	2 times	0.247	0.256	-0.008
	3 or more times	0.236	0.300	-0.065
Purchase from the school canteen/or sellers/shops near the school in the past 7 days: Yogurt	No purchase	0.379	0.168	0.211***
	1 time	0.287	0.338	-0.051
	2 times	0.167	0.249	-0.083*
	3 or more times	0.167	0.244	-0.078*
Purchase from the school canteen/or sellers/shops near the school in the past 7 days: Cheese	No purchase	0.547	0.334	0.212***
	1 time	0.233	0.356	-0.124**
	2 times	0.134	0.176	-0.042
	3 or more times	0.087	0.134	-0.046
Milk consumption habit	One if the student has regularly consumed since Year 1 or prior to Year 1	0.239	0.246	-0.008
Frequency of liquid milk consumption in the past 7 days	Almost every day or everyday	0.214	0.330	-0.116**
	1 time in a week	0.382	0.290	0.091*
	2 times in a week	0.185	0.213	-0.028
	3 to 5 times a week	0.104	0.117	-0.013
	Never	0.116	0.050	0.066**
Types of milk being consumed	Fresh milk	0.210	0.158	0.053
	Sweetened condensed milk	0.511	0.315	0.196***
	Powder milk	0.114	0.224	-0.111**
	UHT milk	0.068	0.108	-0.040

*Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.*

Table 8. Students' WTP and pocket money

Variables	Non-participating students N= 176	Participating students N=406	Difference
Wilingness-To-Pay for 125 ml of fresh milk (IDR)	2085.227	2472.906	-387.679***
Number of days being given pocket money in a week	6.415	6.256	0.159
Average amount of pocket money (IDR)	4514.205	7455.172	-2940.968***
Percentage of pocket money spent on: Food (%)	55.045	48.621	6.424
Percentage of pocket money spent on: Dairy (%)	19.884	21.974	-2.089
Percentage of pocket money spent on: Mobile phone voucher (%)	5.787	12.113	-6.326*

*Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.*

Table 9. Ordered Probit: Determinants of Students' Willingness to Pay

Dependent variable: WTP (500,1000,2000,3000)	**Ordered probit**				**Ordered probit with endogenous regressor**
	(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
One if the student is in Year 5	-0.002	0.06	-0.003	-0.001	0.053
	(-0.008)	(0.292)	(-0.015)	(-0.006)	(0.233)
One if the student is in Year 6	-0.206	-0.155	-0.287	-0.323	-0.24
	(-0.866)	(-0.645)	(-1.161)	(-1.302)	(-0.882)
Student's age	0.009	-0.003	0.057	0.069	0.06
	(0.112)	(-0.043)	(0.685)	(0.836)	(0.712)
One if the student is male	-0.145	-0.141	-0.191	-0.181	-0.193
	(-1.441)	(-1.374)	(-1.797)	(-1.698)	(-1.803)
One if the student walks to school	-0.459***	-0.427**	-0.350*	-0.264	-0.334*
	(-3.392)	(-3.000)	(-2.346)	(-1.739)	(-2.250)
Number of household members	0.025	0.019	0.02	0.026	0.026
	(1.130)	(0.813)	(0.868)	(1.094)	(1.146)
Total number of correct answers at an IQ-like test	0.033	0.037	0.023	0.022	0.037
	(0.583)	(0.649)	(0.392)	(0.377)	(0.645)
One if the student gets pocket money	0.021	0.037	0.057	0.056	0.054
	(0.696)	(1.221)	(1.797)	(1.776)	(1.650)
Daily pocket money (IDR)	0.390***	0.373***	0.350***	0.331***	0.349***
	(4.957)	(4.344)	(3.920)	(3.693)	(3.890)
One of the bathroom is inside the house		0.069	0.104	0.13	0.078
		(0.409)	(0.608)	(0.757)	(0.407)
One if the household owns at least one television		0.228	0.201	0.047	0.228
		(1.312)	(1.140)	(0.257)	(0.983)
One if the student's household owns at least one fridge		-0.036	-0.089	-0.138	-0.051
		(-0.297)	(-0.704)	(-1.067)	(-0.354)
One if the student's household owns at least one motorbike		-0.021	-0.064	-0.075	-0.067
		(-0.182)	(-0.536)	(-0.631)	(-0.572)
One if the student's household owns at least one car		0.252	0.266	0.319*	0.249
		(1.644)	(1.679)	(2.001)	(1.454)
One if the household owns air conditioner		0.785**	0.802**	0.776**	0.781**
		(2.910)	(2.890)	(2.800)	(3.075)
One if the student's household owns at least one computer or laptop		-0.01	-0.134	-0.168	-0.133
		(-0.085)	(-1.027)	(-1.280)	(-1.040)
One if the house floor is ceramic		-0.202	-0.22	-0.244	-0.207
		(-1.504)	(-1.600)	(-1.765)	(-1.362)
Father's age			-0.004	-0.005	-0.003
			(-0.507)	(-0.642)	(-0.497)
Father's education					
Primary education			-0.033	0.02	-0.136
			(-0.101)	(0.060)	(-0.414)
Junior secondary school			-0.221	-0.181	-0.274

			(-0.661)	(-0.538)	(-0.867)
Senior secondary school			-0.058	-0.034	-0.091
			(-0.175)	(-0.101)	(-0.307)
Diploma			8.881	7.962	8.334***
			(0.000)	(0.000)	(23.899)
University and above			0.018	-0.019	-0.016
			(0.046)	(-0.051)	(-0.048)
Mother's age			0.016*	0.016	0.018*
			(2.069)	(1.942)	(2.408)
Mother's education					
Primary education			-0.472	-0.443	-0.485
			(-1.501)	(-1.398)	(-1.820)
Junior secondary school			-0.233	-0.234	-0.234
			(-0.718)	(-0.718)	(-0.852)
Senior secondary school			-0.027	-0.078	-0.028
			(-0.083)	(-0.238)	(-0.103)
Diploma			-0.35	-0.373	-0.32
			(-0.527)	(-0.560)	(-0.517)
University and above			-0.391	-0.456	-0.41
			(-0.992)	(-1.154)	(-1.219)
One if parents consume milk every day or almost everyday			0.586**	0.583**	0.601**
			(2.750)	(2.717)	(2.855)
One if involved in school milk program				0.243	-0.193
				(1.736)	(-0.557)
One if the school is in urban area				0.321**	0.127
				(2.896)	(0.667)
First stage regression:					
Distance to MAS cooperative					0.189***
					(12.390)
cut1					
Constant	-0.039	-0.076	0.465	0.543	0.547
	(-0.034)	(-0.064)	(0.371)	(0.432)	(0.399)
cut2					
Constant	1.45	1.441	2.021	2.139	2.117
	(1.323)	(1.264)	(1.658)	(1.747)	(1.636)
cut3					
Constant	2.242*	2.246*	2.853*	3.002*	2.962*
	(2.043)	(1.967)	(2.338)	(2.449)	(2.281)
cut4					
Constant	3.042**	3.060**	3.698**	3.858**	3.805**
	(2.766)	(2.675)	(3.024)	(3.140)	(2.924)

*Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively. Z-statistics are in parentheses.*

Table 10. BMI Categories

	School milk program participation		
BMI Categories	Yes	No	Total
Grade 3 thinness	8	16	24
	33.33	66.67	100
	4.55	3.94	4.12
Grade 2 thinness	12	19	31
	38.71	61.29	100
	6.82	4.68	5.33
Grade 1 thinness	33	61	94
	35.11	64.89	100
	18.75	15.02	16.15
Normal weight	116	253	369
	31.44	68.56	100
	65.91	62.32	63.4
Overweight	6	43	49
	12.24	87.76	100
	3.41	10.59	8.42
Obese	1	14	15
	6.67	93.33	100
	0.57	3.45	2.58
Total	176	406	582
	30.24	69.76	100
	100	100	100

Note: The first row refers to frequency; the second row to row percentage and the third row to column percentage. Chi-square test: p-value=0.016 implying a significant association between the two categorical variables.

Table 11. IV models: Determinants of health indicators

Dependent variable:	**BMI** (i)	**BMI z-scores** (ii)	**Weight-for-age z-scores (WAZ)** (iii)	**Height-for-age z-scores (HAZ)** (iv)
One if involved in school milk program	0.612	0.276	0.432*	0.360*
	(1.276)	(1.362)	(2.217)	(2.286)
Student's age	-1.314	-0.854	-1.355	-0.522
	(-0.542)	(-0.833)	(-1.375)	(-0.657)
Student's age, square	0.071	0.034	0.054	0.018
	(0.641)	(0.732)	(1.206)	(0.489)
One if the student is male	-0.851**	-0.289**	-0.355***	-0.275**
	(-3.240)	(-2.599)	(-3.317)	(-3.197)
One if the student walks to school	-0.671*	-0.219	-0.154	0.055
	(-1.970)	(-1.522)	(-1.115)	(0.492)
Number of household members	-0.068	-0.032	-0.053*	-0.048**
	(-1.192)	(-1.340)	(-2.291)	(-2.608)
One of the bathroom is inside the house	0.31	0.092	0.128	0.01
	(0.720)	(0.500)	(0.732)	(0.068)
One if the household owns at least one television	0.365	0.245	0.065	-0.028
	(0.749)	(1.190)	(0.328)	(-0.178)
One if the student's household owns at least one fridge	0.033	0.054	0.094	0.121
	(0.102)	(0.390)	(0.708)	(1.134)
One if the student's household owns at least one motorbike	0.03	0.111	0.095	0.085
	(0.103)	(0.897)	(0.797)	(0.881)
One if the student's household owns at least one car	0.044	0.038	0.085	0.067
	(0.120)	(0.244)	(0.573)	(0.560)
One if the household owns air conditioner	1.149*	0.383	0.461*	0.18
	(2.074)	(1.635)	(2.047)	(0.990)
One if the student's household owns at least one computer or laptop	-0.565	-0.313*	-0.325*	-0.161
	(-1.781)	(-2.326)	(-2.519)	(-1.548)
One if the house floor is ceramic	0.197	0.005	0.06	0.027
	(0.576)	(0.038)	(0.434)	(0.239)
Father's age	-0.056***	-0.020**	-0.018**	-0.005
	(-3.327)	(-2.795)	(-2.656)	(-0.886)
Father's education				
Primary education	1.32	0.771*	0.614	0.151
	(1.674)	(2.313)	(1.915)	(0.582)
Junior secondary school	0.138	0.264	-0.069	-0.297
	(0.177)	(0.796)	(-0.216)	(-1.156)
Senior secondary school	0.538	0.305	0.138	-0.084
	(0.710)	(0.953)	(0.449)	(-0.339)
Diploma	-0.572	-0.205	-0.32	-0.307
	(-0.368)	(-0.312)	(-0.507)	(-0.602)
University and above	1.750*	0.717*	0.718*	0.443
	(2.041)	(1.979)	(2.060)	(1.572)

Mother's age	0.044*	0.021*	0.021**	0.011
	(2.238)	(2.533)	(2.656)	(1.638)
Mother's education				
Primary education	-1.717*	-0.795*	-0.682*	-0.237
	(-2.285)	(-2.504)	(-2.233)	(-0.963)
Junior secondary school	-1.954*	-0.899**	-0.685*	-0.106
	(-2.560)	(-2.787)	(-2.208)	(-0.424)
Senior secondary school	-1.375	-0.557	-0.406	0.023
	(-1.811)	(-1.736)	(-1.317)	(0.094)
Diploma	-2.172	-0.594	-0.037	0.855
	(-1.478)	(-0.956)	(-0.061)	(1.772)
University and above	-1.848*	-0.649	-0.496	0.063
	(-1.997)	(-1.656)	(-1.319)	(0.209)
One if parents consume milk every day or almost everyday	0.085	0.1	0.075	0.006
	(0.190)	(0.530)	(0.410)	(0.041)
One if the school is in urban area	-0.1	-0.056	-0.024	0.052
	(-0.361)	(-0.476)	(-0.212)	(0.567)
Number of hours the student spent on watching TV	0.086	0.059	0.053	0.015
	(0.943)	(1.535)	(1.440)	(0.511)
Frequency of liquid milk consumption in the past 7 days	0.001	0.002	0	-0.004
	(0.028)	(0.073)	(-0.005)	(-0.244)
Types of milk being consumed: fresh milk	-0.019	-0.063	-0.014	0.079
	(-0.057)	(-0.443)	(-0.105)	(0.710)
Types of milk being consumed: condensed milk	-0.004	-0.066	-0.041	-0.016
	(-0.015)	(-0.570)	(-0.364)	(-0.181)
One if the student brings no lunch box to school	-0.124	-0.02	-0.029	0.037
	(-0.445)	(-0.168)	(-0.255)	(0.405)
Daily pocket money (IDR)	0.465*	0.111	0.231*	0.229**
	(1.985)	(1.112)	(2.426)	(2.982)
Pocket money spent on food items (%)	-0.001	-0.001	0.001	0.002*
	(-0.376)	(-0.735)	(0.790)	(2.247)
Pocket money spent on dairy products (%)	0	0	0	0
	(0.044)	(0.251)	(-0.373)	(-0.592)
Constant	20.629	4.044	5.608	0.51
	(1.558)	(0.722)	(1.042)	(0.117)
Adj-R2	0.09	0.08	0.165	0.18
No.observations	582	580	581	582

*Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively. The endogenous variable is school milk program participation. The instrument is distance between the school and MAS. Z-statistics are in parentheses.*