ADB Institute Discussion Paper No. 21

Child Malnutrition as a Poverty Indicator: An Evaluation in the Context of Different Development Interventions in Indonesia[1]

Sununtar Setboonsarng

January 2005

Sununtar Setboonsarng is Senior Research Fellow at the ADBI. The views expressed in this paper are the views of the author and do not necessarily reflect the view or policies of the Asian Development Bank Institute.

[1] The paper draws part of the Indonesian experience from an unpublished ADB Study on Indonesia in 2002. For further information on the report, please contact the author.

Abstract

There is no international consensus on what poverty is and how it should be measured. The most commonly used poverty indicator, income level, is limited as it ignores the multi-dimensional character of poverty. Because the choice of an indicator reflects societal values and developmental goals, and because what gets measured gets attention from policy makers and society, the choice of a poverty indicator is important. It sets priorities for policies and programs and determines outcomes of development.

The paper reviews qualifications of a good indicator and proposes child malnutrition as an appropriate poverty indicator. It points out that implications of allowing poverty to affect children go beyond individual children to the health, well being and productivity of future generations and of society as a whole. It finds child nutrition to be a more comprehensive than income level as it is reflective of desirable outcomes of development i.e. improvement in gender equality, intra-household distribution, and health environment quality. Using Indonesia as a case study, the paper evaluates the practicality of adopting child malnutrition as a poverty indicator for ADB's rural development projects. Strengths and weaknesses of three child malnutrition indicators: stunting, wasting, and underweight are reviewed in the context of different development interventions. The paper concludes that child malnutrition is highly relevant conceptually but the practical use as a poverty indicator varies by country due to the limitation on data availability. The paper proposes that child malnutrition be included as one of the millennium development goal indicators.

I. Introduction

Policy makers and donors need baselines and development indicators to monitor the progress and to assess the fulfillment of socio-economic development goals and targets. Indicators are needed to focus decision-makers on sustainable development, and to increase accountability for policies and programs. The choice of indicators reflects societal values and developmental goals. It guides measurement, gets attention from policy makers and society, sets priorities and consequently outcomes of development.

With poverty reduction being the overarching goal of ADB as well as many other development agencies, practical measurable indicators of poverty status are of great importance. A poverty indicator is indispensable for the analysis of problems, the assessment of project implementation, and the improvement of poverty reduction outcomes. In today's environment of declining aid funds, the poverty indicator adopted should be valid and reliable in order to allocate resources toward the poor in the most productive way.

The most commonly used poverty indicator, the financial income level, has limitations both in concept and in practicality of use, particularly in assessing impacts of ADB development interventions in rural areas of developing member countries. In response to the need to consider alternative poverty indicators to assess project interventions, this paper proposes child malnutrition as a candidate for a poverty indicator in ADB agriculture and rural development projects. A review was carried out using Indonesia as a case for investigation.

The sections of this paper review the qualifications of a good indicator, discuss why child malnutrition is considered an appropriate poverty indicator, and describe the child malnutrition indicators. Strengths and weaknesses of three child malnutrition indicators (stunting, wasting, and underweight) are considered in the context of different rural development interventions. The final section presents conclusions and recommendations for ADB operations as well as for development practitioners in general.

II. Qualifications of an Indicator

Indicators are quantifiable statistical markers which are used as proxies or substitutes for measuring conditions that are so complex that there is no direct measurement. They are used to describe the circumstances of societies, to monitor how well development outcomes are being achieved, and to set goals that reflect societal values. They disclose negative and positive trends in society. Indicators serve to measure policy and program progress and to increase accountability.

Effective indicators are relevant, reliable, easy to understand, universal, timely and cost effective. Relevant indicators are ones that directly reflect the goals of policies and programs. Indicator measurement must be accurate, reliable, and comparable across geographical areas. Ideally, the indicator should be simple and easy to understand by the general public. Most importantly, information on it must be collectible at a reasonable cost and be available while there is still time to intervene.

To summarize, a good indicator for an ADB rural development project needs to be 1) relevant to the development objectives of the project, 2) reliably measured through surveys or other empirical instruments, 3) available at minimal cost and comparable across nations and across geographical areas, 4) sensitive to change within the timeframe of the project, and 5) routinely collected by governments and widely accessible to ADB.

Very few indicators fit the all the criteria and each indicator has its strengths and weaknesses. The next two sections discuss the most widely used indicator, income indicator and poverty lines.

III. Poverty Line

There is no international consensus on what poverty is and how it should be measured. The common starting point of many poverty calculations is a food energy intake requirement of 2,100 calories per person per day which is a normal requirement of a human body (Ravallion, 1994). The method of calculation is to use a basket of foods consumed by a "reference population" to fix the mix of foods and their prices. The total food quantity is calculated by scaling the mix of foods to achieve the level of 2,100 calories based on commonly consumed local food items. The poverty line is the expenditure necessary to achieve this caloric intake (Pradhan et. al., 2000). In many cases, consumption expenditures may include other non-food essentials, e.g. clothing, housing and others.

The World Bank calculated the international poverty lines by standardizing consumption levels across countries. Purchasing Power Parity(PPP) is estimated based on new price data generated by the International Comparisons Program for115 countries. The International Poverty Line obtained is equal to $1.08 per day in 2000. As such, average income levels (GNP per capita) are used as a proxy for the poverty level.

IV. Problems with Income (or Expenditure) Level as a Poverty Indicator

While income level appears relevant, the practicality of using it as a poverty indicator is limited by its reliability, cost effectiveness, timeliness, and comparability across countries. Information on income and expenditure is laborious and expensive to collect, particularly in undeveloped rural areas where the majority of the poor in Asia resides. Generally income information is obtained through sample household surveys, during which households are asked to answer detailed questions on their spending habits and sources of income for each of the income earning family members. Such surveys are not only costly but the quality of the data obtained varies. In a subsistence economy where monetary exchange is limited, collecting accurate income or expenditure data from a household is extremely difficult, if at all possible.

Even in areas where monetary exchange is well developed, detailed information on consumption, income and expenditure cannot be accurately obtained through household interviews, which is the common method of obtaining such data. In addition, because prices vary across time and place, the local currency adjustment, the aggregation and calculation of data are generally problematic. The problems generated by spatial and temporal cost of living adjustments make comparisons across countries and geographical areas difficult. The commonly used procedure-conversion by exchange rates into a key currency such as US dollars is known to underestimate the level of economic welfare in developing countries relative to that of developed world. The reason is that market exchange rates are supposed to reflect PPP with respect to tradable goods alone. Since the prices of non-tradable goods are normally low relative to tradable in developing countries, market exchange rates tend to underestimate the purchasing power of local currencies for a wide range of goods and services (Hayami, 2001; Ahmed, 1992).

To reduce the level of complexity, consumption per person was often used to estimate income. However, this method may overstate the extent to which poverty is associated with large family sizes (Bidani et. al, 2001). Income data available through government surveys are also not based on accurate recording, but rather on extrapolations from interpolation between surveys and censuses. Thus, income is not always the most reliable poverty indicator, particularly in the context of rural household.

Timeliness of data is also a serious constraint. Although all governments routinely collect income data, the complex nature of data gathering/calculation is time consuming. Very often, it takes years before official release of data. Long bureaucratic procedures in requesting and obtaining such data means it is generally too late for designing timely interventions.

Because a poverty indicator is used as a basis for resource allocation for donors and governments among countries and regions, comparability across nations and geographical areas is a very important qualification. On this basis, using income or expenditure as poverty indicator is rather problematic. The Summers and Helston (1988) recalculation of income per capita using an approach based on PPP shows that income or expenditure figures must be treated with a good deal of caution. For example, PRC, India, and Pakistan are all ranked fairly closely under conventional national income measures, whereas in their calculation the income per capita of Pakistan is more than 50 percent above that of India and the income per capita of PRC is more than twice of Pakistan.

Within a nation, the problems associated with method of deriving poverty line often led to more than one poverty lines and unsettle debates on which poverty line to adopt for resource allocation decisions. For example, there are national poverty line, provincial poverty line, district poverty line, etc, all of which are different than international poverty line used by donors. This has been causing substantial level of apprehension, nationally and internationally.

In addition to weaknesses in reliability; timeliness and cost effectiveness; and comparability across nations and geographical areas, other shortcomings of income level as a poverty indicator are that it does not reveal inequality within the household (Haddad et. al, 1997; Behrman, 1997) and that it does not taking into account the multi-dimensional nature of poverty i.e. health and community well-being, etc. Given all of these shortcomings, income level seems impractical for measurement of poverty or for monitoring the progress of rural development projects and programs.

V. Malnutrition and poverty

In search for an alternative poverty indicator, this section of the paper reviews the relevancy of using child malnutrition as poverty indicator. Child malnutrition as poverty indicator is conceptually appealing. Increasing health is seen as a dimension of poverty in its own right and child health is known to have important long-term effects on productivity during adulthood. As children are the future of every country, their situation is always of concern to policy makers, their parents and the general public. Ensuring children's health is a universally supported goal of development.

Malnutrition has long been recognized as a consequence of poverty. It is widely accepted that higher rates of malnutrition will be found in areas with chronic widespread poverty (ADB, 2001). Malnutrition is the result of marginal dietary intake compounded by infection. In turn, marginal dietary intake is caused by household food insecurity, lack of clean water, lack of knowledge on good sanitation, and lack of alternative sources of income. It is also compounded by, inadequate care, gender inequality, poor health services, and poor environment. While income is not the sum of total of people's lives, health status as reflects by level of malnutrition is.

Because having good health condition is important precondition for escaping poverty and because improved health and sanitation contribute to growth, investment in people's health and nutrition status is fundamental to improving a country's general welfare, promoting economic growth, and reducing poverty (World Bank, 1993). Meeting primary health care

needs and the nutritional requirements of children are fundamental to the achievement of sustainable development. In the United Kingdom and a number of Western European countries about half their economic growth achieved between 1790 and 1980 has been attributed to better nutrition and improved health and sanitation conditions (Fugel, 1994)

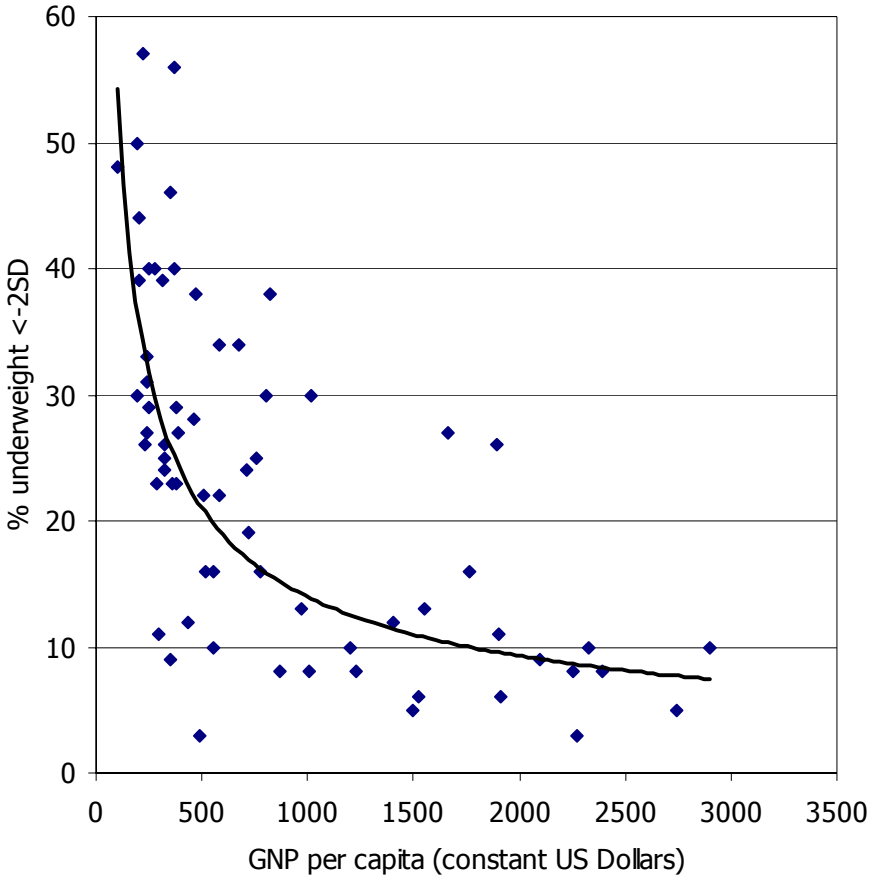
Malnutriton in childhood is known to have important long-term effects on the work capacity and intellectual performance of adults. Health consequences of inadequate nutrition are enormous. It was estimated that nearly 30% of infants, children, adolescents, adults and elderly in the developing world are suffering from one or more of the multiple forms of malnutrition, 49% of the 10 million deaths among children less than 5 years old each year in the developing world are associated with malnutrition, another 51% of them associated with infections and other causes (WHO, 1999). Recent studies have also pointed out that women who were malnourished as children are more likely to give birth to low birth-weight children and thus there is an intergenerational effect of child malnutrition.

A practical advantage of using child malnutrition as a poverty indicator over income level is that this measure does not have to be adjusted for inflation and would not be constrained by any inadequacy of price data. Measures of child nutritional status can help capture aspects of welfare, such as distribution within the household which are not adequately reflected in other indicators. Child malnutrition standards are applicable across cultures and ethnicities.

Studies show that the relationship between child nutritional status and poverty is strong at the lower end of the income range. Increasing GNP per capita from $300 to $600 is associated with a decline in the prevalence of underweight children from about 34% to 17% or a reduction of about 50% (U.N. ACC/SCN, 1992). The data assessment of GNP per capita and the prevalence of underweight preschool children from the World Development Report as presented in figure 1 shows that the countries with the lowest ranking of GNP per capita are more likely to have higher prevalence of underweight children[2].

[2] The analysis gathered information on GNP per capita and prevalence of underweight preschool children from the tables in World Development Report 2000/2001 and selected 66 countries where the GNP per capita is in a range of $100 to $3000, and which have information on the prevalence of child malnutrition.

Figure 1
Comparisons of Countries for GNP per capita and percent underweight preschool children (<-2SD weight for age)



An IFPRI Study in 2000 drawn from the experience of 63 developing countries over this 25-year period on determinants of child malnutrition across different regions found four strong determinants to child malnutrition. The four, ranked by their strength of impact, are women's education, national food availability, women's status relative to men's, and health environment quality (Smith and Haddad, 2000). The findings of this study support the fact that child malnutrition as a poverty indicator is a comprehensive indicator which is reflective and indicative of other desirable outcomes of development i.e. improvement in gender empowerment, intra-household distribution and equality, and health environment quality.

With all of the above consideration, child malnutrition appears as a highly conceptually relevant candidate for a poverty indicator. The following sections further evaluate other qualifications of child malnutrition as a poverty indicator.

VI. Measuring malnutrition

Health or nutritional status of a child is usually assessed in three ways: through measurement of growth and body composition (*anthropometric indicators*); through analysis of the biochemical content of blood and urine (*biochemical indicators*); and through clinical examination of external physical signs of nutrient deficiencies (*clinical indicators*). Among the three method of assessment, anthropometric measurement is a common and easy way to assess health and nutrition status. The other two methods are less practical because of the logistical difficulties and because data collection and analysis is expensive and time consuming.

The following explanation focuses on the anthropometric indicators of nutritional status. Anthropometric information is useful because it provides: 1) a practical way of describing the problem; 2) the best general proxy measure of human welfare of the poorest, reflecting dietary inadequacies, infectious diseases and other environmental health risks; 3) strong and feasible predictors, at individual and community levels, of subsequent ill health, functional impairment and/or mortality; 4) an appropriate indicator of the success or failure of interventions directed toward the many economic and environmental factors underlying nutrition deprivation (UN-ACC/SCN, 1992).

6.1 Understanding the uses of Anthropometric indicators

Anthropometric indices are combination of measurements related to body size and composition. At the individual level, anthropometry is used to assess the person as being in need of special interventions. In population, anthropometric data is used to make decisions about the need for intervention, and what type of interventions is needed and to whom it should be delivered.

To do the anthropometric measurement, four variables need to be collected: age, weight, height (or length of babies) and gender. Each of these variables provides one piece of information about a person. When they are used together, they can provide important information about the person's nutritional status. When two of these variables are used together they are called an index. There are three indexes that are commonly used in assessing the nutritional status: weight for age, height (length) for age, and weight for height (length). When these indexes are compared to a reference standard of anthropometry to assess the magnitude, distribution and severity of a nutritional problem in a country they are called an anthropometric indicator.

There are several possibilities of anthropometric classification by comparison with a reference population. Weight for age is often used to tell if a child is normal, overweight or underweight. When a child weighs less than expected for their age, they are underweight, and when they weigh more than they should for their age, they are overweight. Height (or length) for age is used to tell if a child is the normal height for their age. A child who is not as long or tall as expected may be stunted, meaning that a child did not grow to its full potential. Weight for height helps to identify children who are wasted, meaning that children do not weight as much as they should for their height.

Underweight, stunting, and wasting, are the nutritional status conditions are concerned in anthropometric assessment.

Underweight (Weight for age) is the most common assessment of child nutrition status. It is routinely collected in growth promotion programs, and is a good indicator for children under 24 months because of the need to do precise measurements of weight for these age groups. Weight for age (WFA) is a simple index, but this index does not take height into account. Children who are taller would be expected to weigh more than other children, just as children who are shorter would be expected to weigh a little less and still be healthy

Stunting (Height for age) is a measure of linear growth. Stunting refers to shortness, and reflects linear growth achieved pre- and postnatal; with its deficits it is generally assumed to indicate long-term, cumulative effects of inadequate nutrition and poor health status. Height for age (HFA) is considered a measure of past nutrition, because a child who is short today, maybe did not have adequate nutritional intake at some point in the past.

Wasting (Weight for Height) is a measure of acute or short-term exposure to a negative environment. It is sensitive to changes in calorie intake or the effects of disease. Wasting can

be calculated without knowing the age of a child. Weight for height (WFH) is a measure of current body mass. It is the best index to use to reflect wasting malnutrition, when it is difficult to determine the exact ages of the children being measured.

A child is considered malnutrient if any of these indexes fall below refers two standard deviations (<-2SD) of the median value of the National Center for Health Statistics/World Health Organization (NCHS/WHO) international reference(WHO, 1995). Severe malnutrition is when the indexes fall below 3 SD of the median value.

VII. Choice of Indexes and Nature of Development Program

These three child malnutrition indexes can be used together or separately depending on the purpose of assessment and the nature of intervention. When anthropometric measurement is taken regularly over time, it could provide information on how health status of the population is changing and a timely warning on the food supply and poverty status of a given area. For example, in a food crisis situation, if the purpose is to obtain a quick picture of a community or large body of population to understand the extent of the problem, the measurement of wasting alone would provide sufficient information. When the purpose is to obtain information to decide what types of programs are needed in a specific area, all three indexes of anthropometric measurements: weight for age, weight for age, and weight for height, of the population may need be collected.

In using a child malnutrition index to assess the poverty impact of a development project or program, the choice of index will vary with the nature of the intervention. In programs or projects where intervention impacts are expected within a short period of time, by order of sensitivity, the indexes are wasting, underweight and stunting. Examples of short-term strategic interventions are provision of food supplementation, food fortification, food stamp, school lunch programs, etc.

Where interventions are not expected to be immediate i.e. more than 3-6 years after implementation, by order of responsiveness to changes, stunting, wasting, and underweight, are used to capture impacts. Where interventions is expected to have impact in a long-term, stunting is the best indicator to demonstrate the cumulative impact of nutritional problems.

Table 1 presents a summary of common project/program interventions, design strategy and appropriate child malnutrition indexes to be used for assessing progress and impacts.

Table 1. Child Malnutrition indicator and Development Intervention

Types of Intervention	Design Strategy	Anthropometric Indexes By order of Sensitivity
Food insecurity: Food supplmentation/fortification, food stamp, school lunch program, nutrition education	Short-term	Wasting Underweight Stunting
Agriculture services: intensification of agriculture practices i.e. crops, fishery, livestock, food processing, food price policy	Medium to long-term	Stunting Wasting Underweight
Water supply/sanitation Water accessibility, hygene practices	Short-term	Wasting Underweight Stunting
Rural infrastructure provision rural roads, bridges, schools, health facilities, rural markets, irrigation schemes, electricity, potable water system	Long-term	Stunting Wasting Underweight
Other common interventions		
Food-for-work program, Microfinance	Short-term	Wasting Underweight Stunting
Microenterprise development	Medium-term	Wasting Underweight Stunting
Reforestation, scholarship for poor student	Long-term	Stunting Underweight Wasting

VIII. Weaknesses of child malnutrition as poverty indicator

Responsiveness to changes in each of the child malnutrition indexes are highly sensitive to age group. For example, in most developing countries, the prevalence of stunting in children increases up to the age 24 to 36 months and becomes less responsive to changes after that age. Stunting reflects the cumulative effects of under-nutrition and infections since birth and even before birth and because stunting typically persists over the years and thus reflect the general poor growth environment.

Underweight reflects both the cumulative effects and current effect of malnutrition and therefore, at any one time, is not easy to interpret. Available data may be site-specific, and lack a time series perspective. In some countries, the age of children is difficult to determine. The accurate age of children from poor households are difficult to collect, in particular for

children under two years old when age should be reported in unit of months, not years. It is also difficult to measure the height of children under two with accuracy and consistency. In an ideal child malnutrition data collection system, anthropomorphic measurement of children should be collected at community health service centers, where equipments i.e. scale, measurement tape, etc are available and should be done by staff with a certain level of training. If collected during the survey, additional training (about 0.5 days) will be required for a survey enumerator. Equipment may also need to be brought along during the survey, which may not be practical.

While the relationship between income and child malnutrition is strong for a low income population (i.e. GNP per capita below $900), a study shows that beyond $900, the effect of increasing incomes on nutrition diminishes (UN-ACC/SCN, 1992). However, this is not a serious weakness as the low income population is often the target of development interventions.

Government commitment to data collection, including allocation of sufficient human and financial resources, is lacking in many countries. Availability of data on child malnutrition at a national scale is currently not universally available from all governments. IFPRI reported that out of 179 countries reviewed, nationally representative child underweight data are available in 63 countries(Smith and Haddad, 2000). In assessing the feasibility of child malnutrition as a poverty indicator in ADB agriculture and rural development projects, it was found that among developing member countries of the Asian Development Bank, data are routinely collected and made available only in 12 countries namely Bangladesh, India, Nepal, Pakistan, Sri Lanka, People's Republic of China , Indonesia, Laos, Myanmar, Philippines, Thailand and Viet Nam. Therefore, while comparison across geographical areas within these countries is possible, comparison across the globe is still not possible. Nevertheless, with the growing awareness of importance of health as foundation for sustainable development, it is expected that there will be a gradual increase of governments around the globe collecting the information routinely.

IX. Experiences of Using Child malnutrition Indicator in Indonesia

Here we use Indonesia as a case study to evaluate the practicality of child malnutrion as a poverty indicator in assessing development interventions. The following sections of the paper review the availability of data and the experience of using it in assessing the poverty consequences of development programs.

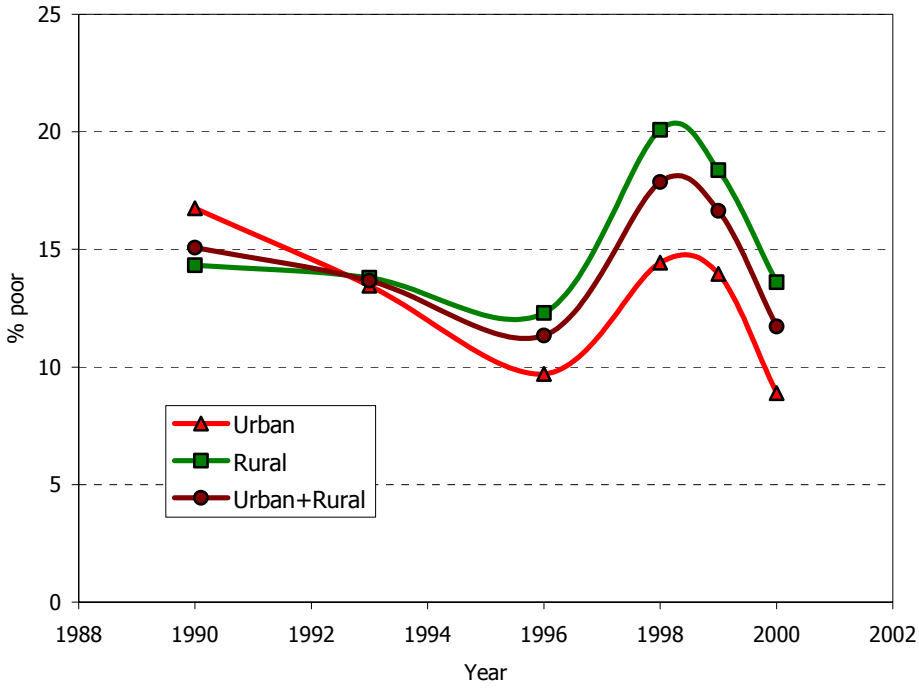
Indonesia achieved a high annual average rate of poverty reduction from 1970 to 1990 (World Bank, 1994). The number of absolute poor reduced from 70 million people in 1970 to 22.5 million in 1996. In 1997, the economic crisis increased the number of the poor in Indonesia to 37.5 million people(Irawan and Romdiati, 2000). National food consumption surveys from 1995 to 1998 found that many households consumed less than 1500 Kcal and 32.2 grams of protein per capita per day (<70% recommended daily allowance). They showed an increasing prevalence of energy deficit from 48% in 1997 to 51.1% in 1998. In line with the food insecurity problem at household level, the Food and Nutrition Surveillance System (FNSS) from all provinces in Indonesia reported an increasing number of cases of severely the malnourished (Marasmic and Kwashiorkor) among under-five children from 1997 to 1999(Atmarita, 2000a).

Indonesia applies the World Bank methodology to estimate the number of people living below the poverty line. The national socio-economic survey (Susenas-type-surveys), which consists of a consumption module, are used to obtain the poverty line. From assessment of this data set, it was found that there was an increasing number of people living below poverty line from 11.34% in 1996 to 17.86% in 1998, and although this was reduced again to 11.72%

in 1999. The trend of people living below the poverty line was similar in pattern with the trend of the severe malnourished (<-3SD) among preschool children. Using the same series of Susenas data sets, it was found that there was an increasing prevalence of the severe underweight among preschool children in the period of 1995-1998, which declined in 1999 (Central Bureau of Statistics, 2000).

Another experience where child malnutrition was used in poverty program management is in measuring the height of school children. In 1994, Indonesia measured the height of the first-grade schoolchildren for all districts. The objective of this measurement is to evaluate the change of mean-height of those children over time. The assumption is that in poor populations the main factors affecting the physical growth of schoolchildren are environmental factors experienced before puberty. These include poor food consumption patterns, illness, lack of sanitation, and poor health and hygiene practices (Bengoa, 1971). Besides the mean-height, the prevalence of stunting (low height for age <- 2SD) was also obtained to compare all districts in Indonesia. Every five years measurement is scheduled to see the change in mean-height of first-grade schoolchildren. This information has allowed the government to target social interventions for human development at high-risk areas. The assessment of 1994 and 1999 data sets found the prevalence of stunting among first grade schoolchildren in Indonesia was reduced only 3.7%, from 39.8% in 1994 to 36.1% in 1999. It also found that stunting is more prevalent among children who enter school at an older age (Atmarita, 2000b).

Figure 2
Trend assessment of percent poverty and prevalence of severe underweight (<-3SD) preschool children



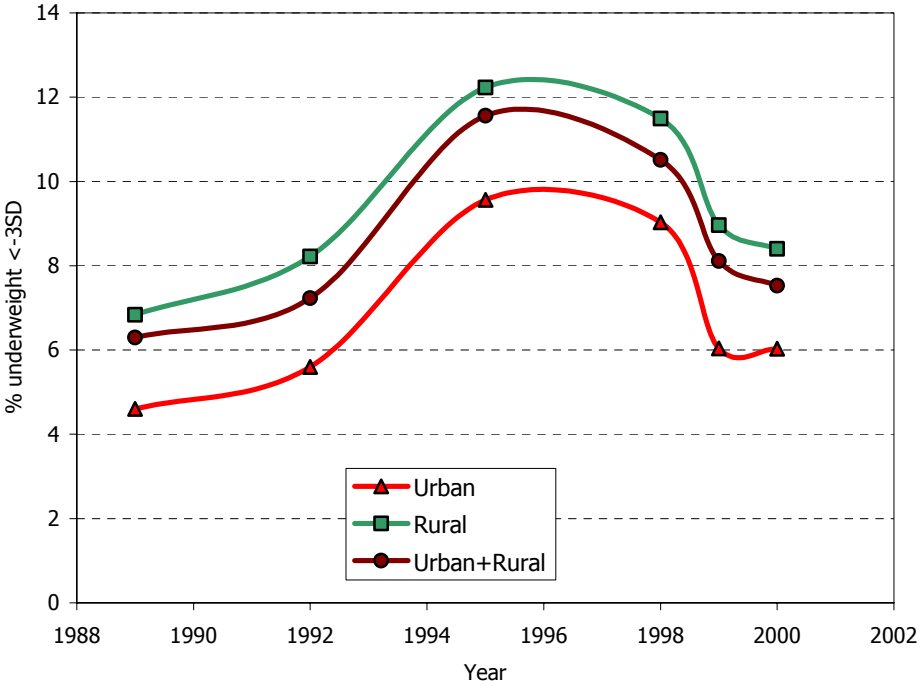
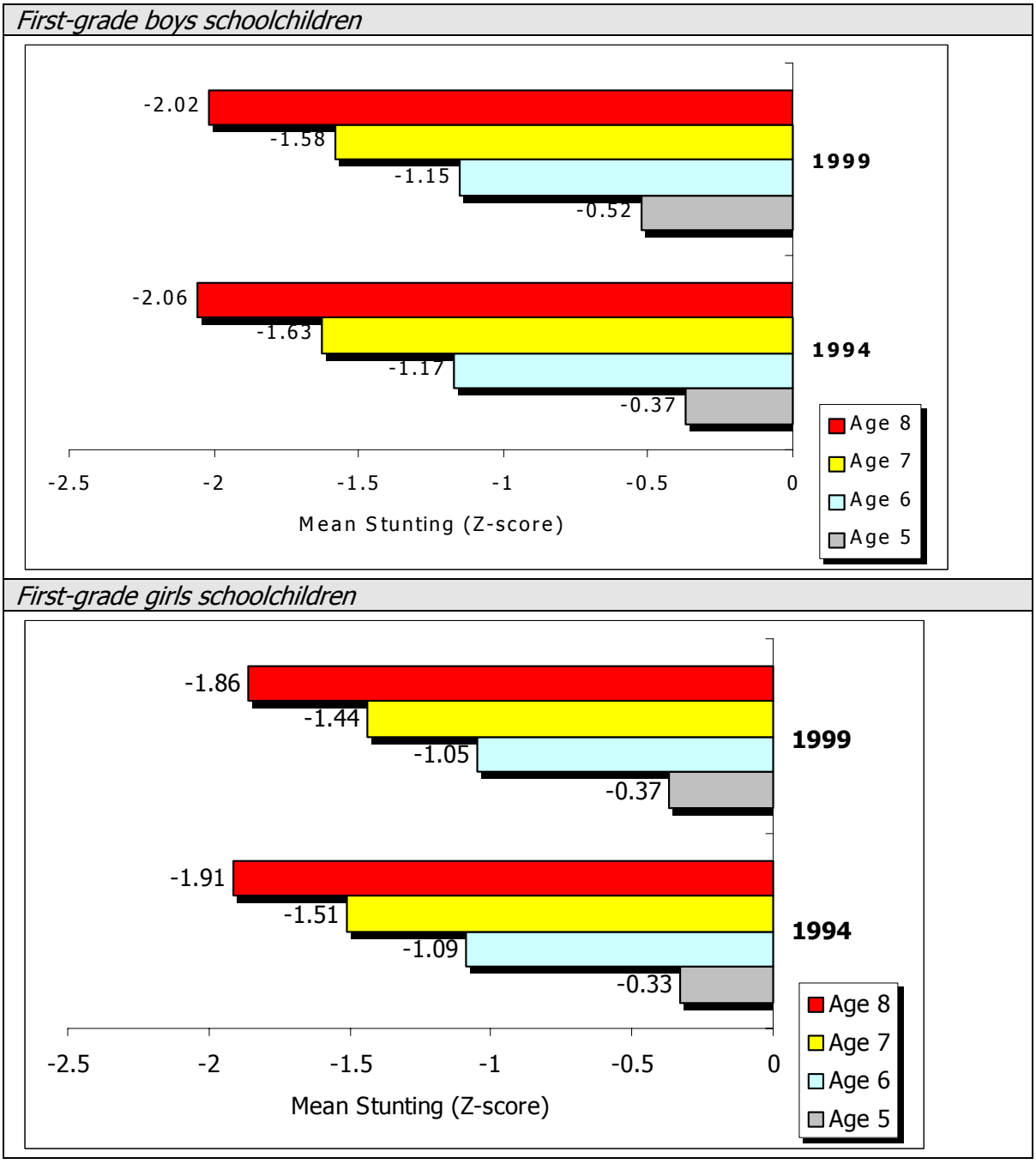


Figure 3
Mean Z-scores height for age (Stunting) among Indonesian first-grade schoolchildren
Comparison between year 1994 and 1999

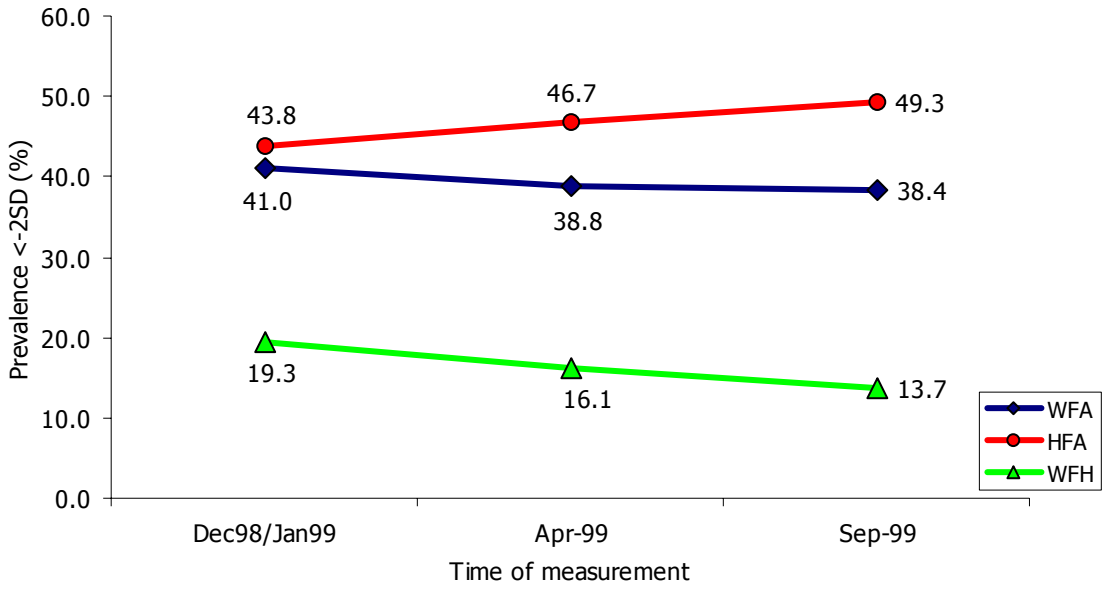


This is evidence that older children have suffered more in early childhood from environmental factors, and boys have a higher risk of stunting than girls. This kind of assessment suggests that height for age is a specific child malnutrition indicator to evaluate long-term human development program.

As explained in the previous section the most sensitive child malnutrition indicator for assessing short-term intervention is the prevalence of wasting (low weight for height). Wasting rates can change rapidly, especially among preschool children in a situation when

food is inadequate. Reassessment of 1998/1999 survey data from small-scale study of the impact of the social-safety net in 5 provinces (Central Java, Jogjakarta, East Java, West Nusa Tenggara and South Sulawesi) found that, wasting among preschool children who received supplemental feeding was a more sensitive indicator compared to stunting and underweight (Atmarita, 2000b). Figure 4 presented the result of measurements from three different times. It can be seen that the prevalence of underweight (low weight for age – WFA) was not reduced consistently, and also stunting (low height for age - HFA) showed an increasing prevalence over time. However, the prevalence of wasting (low weight for height – WFH) declined consistently over time. It fell from the baseline (Dec98/Jan99) to the end of the project (September 1999), by 5.5%

Figure 4
Comparing the prevalence of wasting, stunting and underweight among preschool children (N=4500) who received supplemental feeding from Social Safety Net Project[3]



This assessment suggests that wasting is a sensitive child malnutrition indicator for short-term program intervention such as providing supplementation food to vulnerable groups, especially for the poor.

X. Data sources on Child Malnutrition in Indonesia

The nutrition program is part of the Indonesian development program, which was included in the first five-year national development plan 1979-1984, and nutritional data on several dimensions of nutritional status are routinely collected. The sources of nutritional information along with their strengths and weaknesses are explained in the following sections.

Starting from 1985, the Nutrition Surveillance System was gradually established and expanded to all provinces by the 1990s. There were three data collections assigned to monitor child malnutrition: a) Nutritional Status Monitoring through Socio-Economic Survey (Susenas); b) Nutritional Status Monitoring for sub-district level; c) Nutritional Status Monitoring for first-grade schoolchildren.

[3] The raw data for reassessment received from Dr. Razak Thaha (School of public health, the University of Hasanudin), principal investigator of longitudinal study for the evaluation of Social Safety Net project on food supplementation for preschool children.

The purpose of this data collection is to provide information related to nutrition that is needed for a variety of purposes such as: targeting populations for short-term and long-term policy and program development, monitoring changes and evaluating the impact of interventions.

10.1 Nutritional Status Monitoring through Socio-Economic Survey (Susenas)

The Susenas-type surveys which are integrated into routine Central Bureau of Statistics (CBS) annual surveys consist of social and economic variables. Every year the survey collectis information from 220,000 households. This sample size is representative for the district level (core survey). In addition to the core survey, every three years a special module, such as health, agriculture or education, is implemented as a part of Susenas. The module has a sample size of 65,000 households, which is only representative for national and for the provincial level. The Anthropometric measurement for preschool children was introduced to the Susenas-type-module for the first time in 1989. Weight for age was the anthropometrix index chosen to identify the prevalence of child malnutrition nationally as well as the regional/provincial figures. So, this anthropometric information is available for the years 1989, 1992, 1995 and 1998. From 1999 to 2001, the Ministry of Health supported a Susenas-type-core for the purpose of evaluating the consumption of iodized salt. The anthropometric measurement for preschool children is also expanded to cover the district level. The Susenas-type-surveys do not classify the areas into poor or non-poor, but into urban-rural and by gender differential.

10.2 Nutritional Status Monitoring System at Sub-District Level

The Ministry of Health has its own Nutritional Status Monitoring System for classifying sub-district level nutritional status. The purpose of the data collection is to provide an indication of nutritional status in sub-district areas affected by program development. The underweight data is collected under this system to determine the levels and trends of malnourished children at sub-district levels. The monitoring has been implemented yearly and regularly since 1995 to support district government's prioritizing of the highest risk areas within districts. The calculation of sample size was determined based on the previous prevalence of child malnutrition, and preschool children were chosen based on multi-stage/simple random sample. The data is available at the central level as well as district and sub-district level. There is a problem for continuation of data collection because of budget limitations, especially for the year 2001 when the decentralization system has started. Table 2 compares between these two types of child malnutrition data collections..

10.3 Nutritional Status Monitoring for first-grade schoolchildren.

Starting in 1994, the Ministry of Health decided to evaluate the nutritional outcomes as an impact of program development. National surveys have been implemented for measuring all first grade school age children. The Height for Age (HFA) is the anthropometric index used to measure the children. The data has been collected every 5 years to represent the prevalence of stunted children at the district level. Two data sets are available for the years 1994 and 1999 consist of height measurement for children 5 to 8 years old. The data can be assessed to determine the prevalence of stunting for urban and rural areas and also by gender. A simple random sample was assigned to select elementary schools at the village level, and from selected schools, first graders were measured.

10.4 Village Nutritional Program Data

At the village level, the nutrition program is implemented at Posyandu – the Integrated Health post covering 50-100 households. This growth promotional program includes activities such as immunization, basic health services for mother and children, nutrition counseling, family

planning, and food supplementation. The activities are implementied once a month by cadres and supervised by health staff from health centers.

Example: ***Indonesian Growth Card***

Using the growth card, all three indexes wasting, stunting and underweight are collected for children visiting the Health Post. The monitoring use growth chart and the growth faltering are detected when a child's growth curve declines at less than the curve from the growth chart. If it could be assumed that all mothers and children of the village make use of the services regularly, then the village health post would be the most complete source of information on children's nutritional status in Indonesia.

10.5 Child Malnutrition Data from Special Surveys/Studies

The anthropometric information is also available from special surveys or studies. Usually these special surveys/studies collecting all three indexes of child malnutrition. For example:

a) The longitudinal survey from Helen Keller International is collecting the information from urban and rural areas within 7 provinces in Indonesia (West Java, Central Java, Lampung, West Sumatra, South Sulawesi, West Nusa Tenggara, and Jakarta).
b) The national vitamin A survey in 1978 and 1992 covered all provinces

The longitudinal study for evaluating Supplementary Feeding as the impact of the Social Safety Net Project was in 5 provinces in 1998/1999.In addition there are also other surveys, such as a Mother and Child health survey in 1995, the Indonesian Family Life Survey, the Eastern Island Survey and several small-scale studies.

Table 2. Comparison of Susenas and Sub-district Nutritional Status Monitoring

	Susenas-type Surveys	Sub-District Nutritional Status Monitoring
Year of Survey	1989 – 1998 (every three years); 1999 – 2001 (every year)	1995 – present (every year)
Survey Design	Cross-sectional, Multi-stage cluster	Cross-sectional, Multi-stage cluster/simple random sampling
Sampling/ representativeness	Representative for National and/or Provincial Level only for 1989-1998 data sets; and representative for district level for 1999-2001 Susenas.	Representative for sub-district level as well as higher administrative levels.

Sample Size	Calculated based on demographic assumptions and socio-economic conditions	Calculated based on epidemiology assumptions using the previous prevalence of malnourished children
Number of house-hold	1989-1998: 65,000 1999-present: 220,000	Can not determined, all the households that have preschool children from selected villages.
Number of children measured	For Susenas 1989-1998: Less than 30,000 children For Susenas 1999-presents: between 70,000-75,000 children	It ranges from 1.5 to 2.2 million children for the whole countries, or between 200 to 1000 children per sub-districts depending on sub-district representativeness.
Data Collector	Staff of Central Bureau Statistics at sub-district level	Nutrition staff from Ministry of Health at Sub-district level (Health Center)
Index collected	WFA for preschool children	WFA for preschool children
Instrument	Any available scales: dacin (special weighing scale designed for Indonesia), bathroom scale, etc	Dacin
Precision/accuracy	Standard Deviation : 1.6	Standard Deviation : 1.1
Estimated Cost for data collection and analyses	$6 per household (all variables) or <$1 per household for anthropometric variables only	It is about equal to $1 per household
Data accessibility	Available in Central Bureau of Statistics – Jakarta	Available at all administrative levels from sub-districts to central levels
Data assessment	Can be aggregated by gender, urban-rural areas.	Can be aggregated by gender, age groups, urban-rural areas.

*) *1 US$ = Rp 9200,-*

We now consider the advantages and disadvantages of *existing data on child malnutrition* for the purpose of monitoring and evaluation of the impact of nutrition program development:

1) Data on wasting from growth promotion at Posyandu is best suited to program intervention at the individual level, because it catches growth faltering, an early sign of health and nutrition problems. However, coverage above 80% is desirable to capture all the important differences for comparing the impact of short-term program interventions. Generally, after the infant reaches 24 months, the attendance at the Posyandu declines dramatically.

2) Data on underweight from the Susenas-module data set is good for comparing the impact of program interventions at national or provincial levels. The information on malnutrition prevalence may be not specific for a certain area because of sample size. Anthropometric information from the Susenas-core-data set is good for the district level.

3) Data on underweight from sub-district nutritional status monitoring is feasible for comparing sub-districts to support government at the district level in prioritizing sub-district high-risk areas.

4) Data on stunting from first-grade schoolchildren is good for evaluating long-term program development (5 years and above).

5) Anthropometric information from special surveys or studies is good for certain areas with limited sample size, and it is not universal.

XI. Using Child Malnutrition to Assess Implementation of Project in Indonesia

In general, the implementation period of a development project i.e. government programs or ADB agriculture and rural development project, is 4-5 years. The child malnutrition indicator, which is most appropriate to assess change within the period of project life, would be wasting. In general, a project is reviewed annually and at mid-term of the project where major design changes are often brought about. Since wasting is sensitive to change within this timeframe, timely interventions could be design and implemented.

Based on information from the previous section, it would appear that data from Village Health Post (Posyandu) where wasting information is routinely collected would be the most appropriate source. However, since the decentralization policy was put into operation in 1999, the responsibility of implementing the health program at the Village Health Post shifted from the Central Government to the district governments. Many district governments did not prioritize this program due to budget problems, so the program and the data collection was discontinued.

The feasibility of using the Posyandu data for assessing the poverty impact of projects of a short-term nature is therefore subject to the geographical coverage of the project. The availability of data in areas under project coverage will need to be investigated on a case-by-case basis.

In the case where a district under project coverage does not have the required data, the possibility of collecting child malnutrition for use in monitoring the project was also explored. Based on cost information from other surveys in Indonesia, it was estimated that data could be collected with additional cost of USD $1/household, during a survey. While cost of data collection does not appear to be a major impediment, implementation agencies of projects outside of Ministry of Health may not view primary data collection as their role.

As for a long-term project, since secondary data on underweight and stunting are routinely collected by the central government and are readily available on a nationwide basis, using child malnutrition as poverty indicator in such projects is feasible and is recommended.

XII. Conclusion and Recommendation

Although income or expenditure level as a poverty indicator appears relevant conceptually, the practical use is limited by its reliability, cost effectiveness, timeliness, and comparability across countries. The use of income or expenditure as poverty indicator has numerous problems particularly in using it in monitoring poverty impacts of agriculture and rural development projects. Prompted by the need for an alternative indicator for ADB rural development project, the paper evaluates the possibility of introducing child malnutrition as an alternative poverty indicator to the commonly used income indicator. The evaluation shows that child malnutrition as poverty indicator to assess the fulfillment of socio-economic development goals and targets is conceptually sound and is more practical. Empirical studies show that child malnutrition is closely linked to income level, the widely used poverty indicator. A study also shows that child malnutrition is reflective and indicative of other desirable development outcomes i.e. gender equality, intra-household distribution, and health environment quality. That the relationship between child malnutrition and poverty is most sensitive at the lower end of the income range makes child malnutrition a good indicator for development intervention projects and programs, which generally target this section of the population.

On the basis of accuracy, anthropometric measurement, i.e. measuring weight and height of children using objective tools, is far more accurate than collecting information on income and/or expenditures based on recall during a survey, particularly in the context of rural households in a subsistence economy. Measurements of child malnutrition do not need to be adjusted for inflation and so are not constrained by any inadequacy of price data. On the basis of cost effectiveness and timeliness of data collection, anthropometric measurements are also superior to an income or expenditure indicator as collecting information on all income sources of all income earning household members or collecting all expenditures of a rural household is extremely laborious and time-consuming.

While conceptually sound, because the concept of using child nutrition as a poverty indicator is relatively new, data availability across the globe is still limited. Using Indonesia as the case to explore the possibility of adopting child malnutrition as a poverty indicator for ADB agriculture and rural development projects, the paper found that there is a high level of awareness of the of linkages between child malnutrition and poverty in Indonesia and several secondary sources of data on child malnutrition are readily available.

For development interventions where the expected poverty impacts are expected to be manifest in the medium or long-term, it is highly feasible to adopt child malnutrition as a poverty indicator. Since baseline information and information on subsequent years are available through secondary sources, change in children's nutritional status can easily be tracked. However, for short-term intervention projects, the feasibility of tracking the change in children needs to be investigated on a case by case basis due to discontinuation of data collection by some district governments after decentralization in 1999.

While child malnutrition could not universally be adopted as a poverty indicator at this point of time due to lack of universally available data, it's strength and relevance as a poverty indicator, particularly for monitoring poverty impacts on the low income population, is gradually being recognized by governments and international agencies around the globe. The Food and Agriculture Organization of the United Nation(FAO) and the International Funds for Agriculture and Development has recently included child malnutrition as one of the indicators to be assessed in their projects and programs. With this growing awareness, it is expected that it will be widely adopted by all governments in the near future.

To raise the commitment of governments and donors to prioritize resources to ensure children's health and to encourage routine data collection by all governments, it is recommended that child malnutrition be included as one of the millennium development goal indicators.

Reference

ADB (2001). *Improving Children Nutrition in Asia*. Nutrition and Development Series No. 3. Manila.

Ahmad S (1992). "Regression Estimates of Per Capita GDP Based on Purchasing Power Parities", Policy Research Working Paper WPS 956, Washington, DC: World Bank.

Atmarita et.al (2000a). "The Trend of Household Food Consumption Before and During Crises in Indonesia". *Proceedings of the 7th National Workshop on Food and Nutrition*, Jakarta, Indonesia.

Atmarita (2000b). "The Report of Assessments of School-entrance Children 1994 and 1999 Surveys", Directorate of Community Nutrition, Ministry of Health, Jakarta, Indonesia.

Atmarita (2001). "The Assessment of Nutritional Status Among Preschool Children from Susenas Data sets", Directorate of Community Nutrition, Ministry of Health, Jakarta, Indonesia.

Bengoa JM (1971). Significance of Malnutrition and Prioritization for its Prevention, National Development, and Planning, Paper presented at an International Conference held at Cambridge, MA, USA

Behrman J (1997). In *Handbook of Population and Family Economics*, edited by M.R. Rosenzwieg and O. Stark. Elsevier Science B.V.

Bidani. B, Datt G. Lanjouw J, and P. Lanjouw (2001) "Reforming Policies and Institutions for Poverty Reduction", Asia and Pacific Forum on Poverty. ADB. Manila

Central Bureau of Statistic (2000): Penyempurnaan Metodologi Penghitungan Penduduk Miskin dan Profil Kemiskinan

Fogel, R (1994). "Economic Growth, Population Theory, and Physiology: The Bearing of Long-Term Processes on the Making of Economic Policy," *American Economic Review*, Vol 84. No. 3

Haddad, L. Hoddinott, and H. Alderman, eds, (1997). *Intra-household Resource Allocation: Methods, Models and Policy.* Baltimore: Johns Hopkins University Press.

Hayami, Y (2001). *Development Economics, 2nd ed*. London: Oxford University Press.

Irawan ,P.B and Romdiati, H (2000). "The impact of Economic Crisis on Poverty and its implications for Development Strategies." *Proceeding of the 7th National Workshop on Food and Nutrition*, Jakarta, Indonesia.

Pradhan M., Suryahadi A., Sudarno S., and S. Preichett (2000). "Measurement of Poverty in Indonesia: 1996, 1999, and Beyond", Working Paper of the Social Monitoring and Early Respond Unit (SMERU). Indonesia

Ravallion, M (1994). Poverty Comparisons: Fundamentals of Pure and Applied Economics. Volume 56. Harwood Academic Press, Chur, Switzerland

Smith and Haddad (2000): Overcoming Child Malnutrition in Developing Countries: Past Achievements and Future Choices. IFPRI 2020 Brief No. 64.

Summers, R. and A. W. Heston. (1988) "A New Set of International Comparisons of Real Product and Prices Levels: Estimates of 130 Countries, 1950-1985". *Review of Income and Wealth* 34(1) (March): 1-25

UN ACC/SCN (United Nations Administrative Committee on CoordinationÑSub-committee on Nutrition). 1992. Second Report on the World Nutrition Situation, Volume 1. Suffolk, England: The Lavenham Press Ltd. for the United Nations ACC/SCN Secretariat.

World Bank (1993), *World Development Report 1993: Investing in Health*, Oxford University Press, Oxford

World Bank (1994). *Country Study Indonesia- Sustaining Development*

World Health Organization, 1995. Physical Status: The use and interpretation of anthropometry. WHO Technical Report 854. Geneva.

World Health Organization(1999). Progress towards elimination of iodine deficiency disorders. Geneva, World Health Organization, (unpublished document WHO/NHD/99.4; available on request from Department of Nutrition for Health and Development, World Health Organization, 1211 Geneva 27, Switzerland).