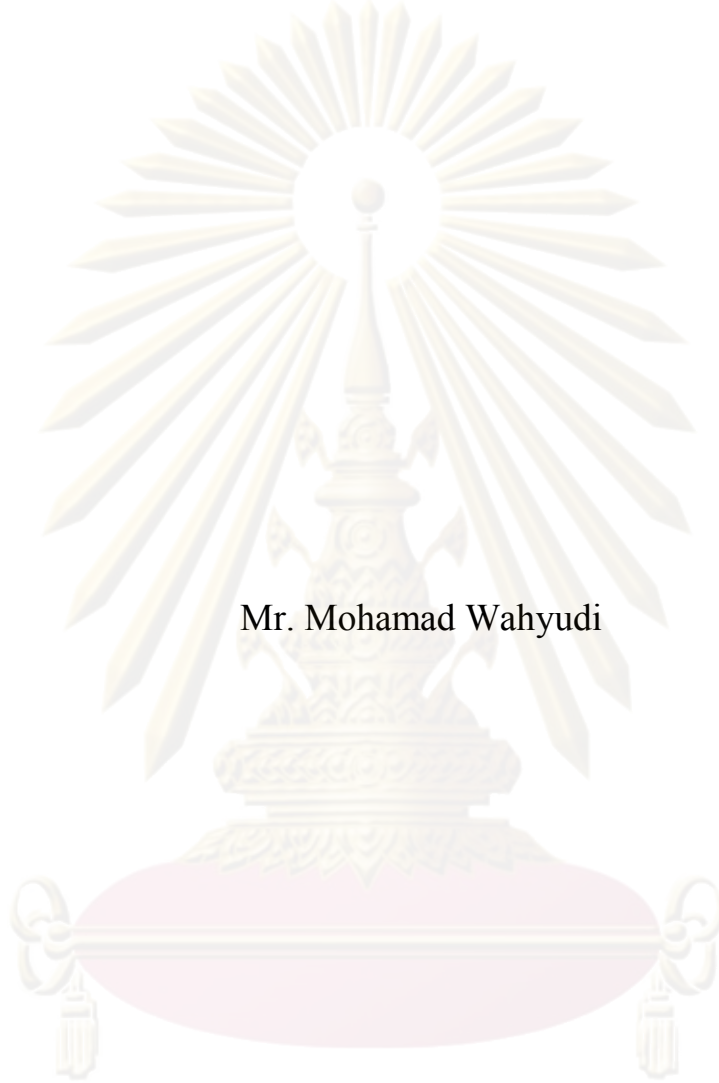


DETERMINANTS OF INEQUALITY IN UNDER FIVE NUTRITION
STATUS IN WEST NUSA TENGGARA PROVINCE
INDONESIA 2008



Mr. Mohamad Wahyudi

ศูนย์วิทยทรัพยากร

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science Program in Health Economics

Faculty of Economics
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ปัจจัยกำหนดความไม่เท่าเทียมในภาวะทุพโภชนาการของเด็กอายุต่ำกว่า 5 ขวบ
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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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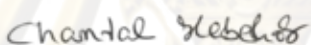
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นายมุฮัมหมัด วายูตี : ปัจจัยกำหนดความไม่เท่าเทียมในภาวะทุพโภชนาการของเด็ก อายุต่ำกว่า 5 ขวบ ในจังหวัดนูซาเต็งการาตะวันตก ประเทศอินโดนีเซีย ปี พ.ศ. 2551. (DETERMINANTS OF INEQUALITY IN UNDER FIVE NUTRITION STATUS IN WEST NUSA TENGGARA PROVINCE, INDONESIA 2008) อ. ที่ปรึกษาวิทยานิพนธ์หลัก : รศ. ดร. อิศรา ศานติศาสน์ , 64 หน้า.

จังหวัดนูซาเต็งการาตะวันตก (West Nusa Tenggara, NTB) เป็นจังหวัดหนึ่งในประเทศอินโดนีเซียที่มีสัดส่วนของภาวะทุพโภชนาการสูงและมีอัตราการตายของทารกแรกเกิดสูง ปัญหานี้มีปัจจัยเบื้องหลังหลายปัจจัย การศึกษานี้วิเคราะห์ระดับความไม่เท่าเทียมกันทางสังคมของชุมชนในองค์การบริหารงานส่วนท้องถิ่นเกาะมาตาน และระดับความสัมพันธ์ของตัวแปรต่างๆ กับภาวะทุพโภชนาการในพื้นที่ภายใต้ฐานข้อมูลทุติยภูมิภาคตัดขวาง

การวิเคราะห์ระดับความไม่เท่าเทียมกัน ใช้ดัชนีชอร์รอกะดับที่ 2 เพื่อแยกวิเคราะห์ดัชนีความไม่เท่าเทียมกันในพื้นที่เกาะและระหว่างพื้นที่ในจังหวัดนูซาเต็งการาตะวันตก การวิเคราะห์พบว่าระดับความไม่เท่าเทียมกันทางด้านสาธารณสุข การกระจายของเจ้าหน้าที่ทางด้านสาธารณสุข ช่องว่างของความยากจน และความไม่เท่าเทียมกันของเชื้อชาติระหว่างชามาวาและโมบมะระหว่างชุมชนเป็นปัจจัยที่ส่งผลทำให้เกิดภาวะทุพโภชนาการ

การวิจัยครั้งนี้สามารถอธิบายช่องว่างความยากจนในระดับพื้นที่และปัจจัยอื่น อาทิเช่น รายได้ของครัวเรือน ความยากจนของครัวเรือนในชุมชน ตลอดจนความจำกัดในการเข้าถึงโครงสร้างสวัสดิการพื้นฐานของภาครัฐ เช่น การศึกษาขั้นพื้นฐาน การบริการทางด้านสาธารณสุข ระบบน้ำและสาธารณูปโภค ซึ่งปัจจัยดังกล่าวเป็นปัจจัยที่ส่งผลทำให้เกิดภาวะขาดสารอาหารในจังหวัดนูซาเต็งการาตะวันตก การนำกลยุทธ์ที่แตกต่างกันปรับใช้ในแต่ละพื้นที่ที่สามารถช่วยลดภาวะทุพโภชนาการในทุกพื้นที่ที่ใกล้เคียงกันกับพื้นที่ที่ทำการศึกษา

ศูนย์วิทยทรัพยากร

จุฬาลงกรณ์มหาวิทยาลัย

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West Nusa Tenggara (NTB) is one of the Province with high prevalence of malnutrition, and also the province with the highest infant mortality rate in Indonesia. The problem is caused by many factors. This paper analyzes the level of social economic inequalities on community in the sub district (Kecamatan) and its relationship with prevalence of malnutrition in a region based on cross sectional secondary data.

Inequality analysis used Shorrock Index order 2nd, find out inequalities within regions (Island) and among regions (Island) in the West Nusa Tenggara Province. The analysis found, that inequalities in health services, health worker distribution, poverty gap and ethnicity (Samawa and Mbojo) within a community are major factors causing the high prevalence of malnutrition.

This research also found that the poverty gap within a region and other factors i.e. household poverty incidence in the community, as well as the limited supply of basic infra-structure such as, health facilities, clean water and sanitation are underlying factors that caused the high prevalence of malnutrition in NTB Province. Different strategies are needed to reduce the prevalence of malnutrition in the region (Island) and also other regions with similar background.

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LIST OF ABBREVIATIONS

ANC	: Ante Natal Care
APBD	: Anggaran Pembangunan Belanja Daerah
BAPPENAS	: Badan Perencanaan Pembangunan Nasional
BPS	: Biro Pusat Statistik
DSO	: District Statistic Office
DHA	: District Health Account
DHO	: District Health Office
DAU	: Dana Alokasi Umum
DAK	: Dana Alokasi Khusus
FAO	: Food and Agriculture Organization
GDP	: Gross Domestic Product
HAZ Score	: Height Age Z score
IMR	: Infant Mortality Rate
IDHS	: Indonesian Demographic Health Survey
MDG's	: Millennium Development Goals
MOH-RI	: Ministry of Health Republic Indonesia
MMR	: Maternal Mortality Rate
NTB	: Nusa Tenggara Barat
PGI	: Poverty Gap Index
PHO	: Province Health Office
PSO	: Province Statistic Office
Posyandu	: Pos Pelayanan Terpadu
SUSENAS	: Survey Sosial Ekonomi Nasional
SPGI	: Severe Poverty Gap Index
UNDP	: United Nation Development Program
UNICEF	: United Nation International Children's Emergency Fund
WHO	: World Health Organization
WHZ score	: Weight Height Z score
WAZ score	: Weight Age Z score

CHAPTER I

INTRODUCTION

1.1. Problem and Its Significance

The Millennium Development Goals are a set of internationally agreed goals to which countries and institutions have committed themselves to reach by 2015. Eradicating hunger and extreme poverty is one of 18 specific targets accepted for measuring development progress in every country. This goal includes a target of the halving between 1990 and 2015 of the proportion of people who suffer from hunger, with progress to be measured in terms of the prevalence of underweight children under five years of age. The target implies an average annual rate of reduction of 2.7 percent malnutrition (WHO-UNDP, 2000; World Bank, 2006 a).

In many countries, issue of nutrition status in children is very common and has become challenges. Approximately 178 million and 112 million of children under five years are stunted (Black, et al. 2008). Indeed, improving the nutrition status of children is not only an indicator, but also a goal in program of reducing poverty, food and health sector development.

The impact of malnutrition not only affects the children, but also society where they live. Besides, it will reduce productivity, economic growth and performance of education, death, disability, mental retardation and physical stunt. A study undertaken by Cleaver, Okidegbe, and De Nys (2005), theorize that economic loss to a nation caused by malnutrition can be estimated in term of lost productivity per individual worker. Furthermore, World Bank also estimates the productivity loss individuals are more than 10 percent of lifetime earnings, and GDP lost to malnutrition runs as high as 2 to 3 percent (World Bank, 2006 b). For example, the annual economic loss in Nigeria due to malnutrition in children under five in 1994 has been estimated at \$489 million, or about 1.5 percent of GDP (FAO, 2004). World

Bank also explained, that a one-percent increase in height has been associated with a 4- percent increase in total wages (World Bank, 2006 a).

Malnutrition is an underlying cause approximately 55 percent of under five mortality in developing countries (WHO 2004; WHO 2005); malnutrition is also close associated with mortality (Pelletier, et al. 1993; Davidson, 2002, Gabriel, et. al 2007, Pelletier and Frongilo, 2003), globally contributing to about six million of the 10.9 million deaths of under-five children each year (Gupta and Rohde, 2004). That is why nutrition program investment in child will contribute not only in the child itself but also in the society.

Improving nutrition status in children is therefore as much ~ or more ~ of an issue of economics as one of welfare, social protection, politics, and human rights (see Haddad, 2002; Pelletier, 2002; Eide, 2002; Shrimpton, 2002). It means improving nutrition is essential to reduce extreme poverty, to increase human capital, to improve productivity in all sector include education and agriculture sectors. Poor performance education is closely related with nutrition status during under five years old. Reducing malnutrition can lead to the higher school attendant, better learning also increasing performance of completion rate, furthermore lead to higher wages rate if they enter the labor market.

In the microeconomic and macroeconomic level, there are many factors can affect on health and nutrition status such as; economic growth, family income, poverty, health access, water and sanitation, education and gender (Preston, 2007, Saadah, et al. 1999; Thomas and Frankenberg 2002), political instability, the frequency of infectious diseases and the lack of education (Blössner and de Onis. 2005). These determinants may vary across the country. A cross-country analysis carried out by Frongillo, de Onis and Hanson (1997), found that the determinants of nutrition status in preschool children that measured by HAZ score varied between nations, and among provinces within the nations.

In order to achieve MDG's target, Indonesia has endeavored to achieve some of commitments in health development indicator. Child mortality declined from 220 per 1,000 live births in the 1960 to 46 per 1,000 live births in 2002. While, maternal mortality rate still high at 420 deaths per 100,000 live births. The average malnutrition rate among children under five is also high, at 25 percent (Bappenas, 2007). In the decentralization era, anxiety emerges upon the rising number of provinces and districts that have highest trend of malnutrition. Because reducing malnutrition would depend on the priority goal and local policy of the district. Besides, there were many problems confronted in health and nutrition development in the province or in the district such as, disparity on fiscal capacity, geographic disparities, width of the area and affectivity of government in the local level.

West Nusa Tenggara (NTB) Province is one of provinces in Indonesia that lack of seriousness on developing performance achievement. NTB Province is always on the latest rank of human development index in Indonesia since 1990 to 2007 based on Human Development Report (BPS-UNDP, 2001; BPS-UNDP, 2003; BPS-UNDP, 2004; Bappenas, 2007). This was due to high Maternal Mortality Rate (MMR) and high Infant Mortality Rate (IMR) that could reduce life expectancy rate in that province. For example in 1999, average of life expectancy rate in NTB was only 57.8 years and Indonesian average was 66.2 years (BPS-UNDP, 2001). According to 2002–2003 statistics of the Indonesian Demographic Health Survey (IDHS), NTB had the highest U5MR between 1998 and 2002, with 103 per 1,000 live births. This was nearly five times higher than the U5MR in Yogyakarta Province of 23 per 1,000. Over the same period, similar variations can be seen with the IMR, which was 74 per 1,000 in NTB, and 20 per 1,000 in Yogyakarta (BPS-UNDP, 2003). Report on MDG's in 2007 also showed similar indications. The highest infant mortality rates were in West Nusa Tenggara (66), followed by Gorontalo (50). On the contrary, the provinces with the lowest infant mortality rates were Bali (18), Jakarta (19), and the Riau Islands (19) (Bappenas, 2007).

Similar problems exist in under five malnutrition, the most important determinant of infant mortality rate. Data of under-five malnutrition indicated the

same patterns with data of IMR. For example in 1999, under five malnutrition (Z score < 2 SD) in NTB was 32.86%. Indonesian average was 26.36 %. Jogjakarta Province in the same period was 15.63 % (BPS-UNDP 2001). In 2005, there were 15 provinces where the percentage of malnutrition was larger than the national figure. National average of malnutrition was 26%, while NTB Province still on 33.3%. It means during five-year performance malnutrition did not change. Meanwhile, Bali, the neighboring province, malnutrition rate was only 15.1% (Susenas, 2005). Poverty indicator also showed the similar indication. Severity of poverty index ranked 26 of 33 provinces in Indonesia. Poverty Gap Index (PGI) in this province was 4.35 and Square Poverty Gap Index (SPGI) was 1.16 higher than national average (Bappenas, 2007).

Many studies have shown that malnutrition is highly associated with high child mortality. On the other hand, child survival could be improved by reducing the level of malnutrition status in the children and improving nutrition status of woman particularly in pregnant period (Onis, 2000; Gomez, et al. 1956). Malnutrition also has biggest impacts in populations with high mortality and morbidity (Pelletier, 1994). This condition will have more serious effect if the majority of the populations are poor families. Because with low income, poor family cannot reach and fulfill the basic need (health, food, education, etc.) for their life. It means poor family and poor population more suffered and susceptible with the malnourishment impact.

Based on the data above, the provinces with the best infant mortality rates had an infant mortality rate of almost four times lower than that of the provinces with the worst infant mortality rate; and, for malnutrition almost two times lower. This indicated that the disparity between regions was caused by a variety of reasons that were unique to each region. Unfortunately, to the best of our knowledge, there was no evidence to justify that. Very few of previous studies had analysis in sub district, particularly in West Nusa Tenggara, or in Indonesia.

Usually, research on health status is more clinically oriented with the result that is useful on clinical policy. Space of region and socioeconomic factor are not

eminent in their analysis. Whereas, in the context of public policy, spatial analysis and socioeconomic factor that related to health status are very important for policy maker. In epidemiology theory, natural history of disease is normally described with triad factor such as the host, biological/chemical/physical agents (something that can affect on health status) and environment factor. Disease will emerge if interaction between triad factors above is not balanced. Interpretation about environment in that theory includes the socioeconomics (education, income, and poverty), space/region, behavior, culture, climate, politic, etc. As we have discussed above, health status on children, besides clinical factor, socioeconomics factor can also influence the health status. Research in Malawi showed, the Northern region had lowest infant mortality rate than the Southern region (Kalipeni, 1993). Gragnolti, et al. (2005) found that malnourished children were concentrated in districts that had scarce resources and energy in India. Research in Indonesia showed similar indication. Kalimantan, Java and Bali islands had lowest level of malnutrition since 1992, but there has been no change on the other islands (Saadah, et, al 1999).

Empirical studies on the causes of child malnutrition particularly in West Nusa Tenggara will help policy makers in local level to improve their intervention on nutrition programs more effectively and efficiently especially in this decentralization era.

1.2. Research Questions

1.2.1. Primary Research Question

Can regional socioeconomic factors affect on nutrition status of the under five children in West Nusa Tenggara Province?

1.2.2. Secondary Research Questions

1. How does spending in health program by local government affect on nutrition status of the under five children in West Nusa Tenggara Province?
2. What is the correlation between the percentage of poor household (poverty incidence) and nutrition status of children under five years old in sub district?
3. What is the degree of inequality nutrition status of the under five children between Lombok island and Sumbawa island in West Nusa Tenggara Province?

1.3. Objectives of Study

1.3.1. General Objective:

To determine the relationship of regional (sub district) socioeconomic factors that affect on nutrition status of children under five years old in West Nusa Tenggara Province

1.3.2. Specific Objectives:

- To identify the major socioeconomic determinants that affect on nutrition status of children under five years old in West Nusa Tenggara Province
- To examine how spending nutrition program set by local government, as characterized by proportion health expenditure and total expenditure in district/city, has affected to improve nutrition status of children under five years old in West Nusa Tenggara Province
- To analyze the correlation between the percentage of poor households (poverty incidence) in population and nutrition status of children under five years old in West Nusa Tenggara Province
- To analyze the contribution of inequality within an island/group and the contribution of inequality between islands/groups in the nutrition status of children under five years old in West Nusa Tenggara Province

1.4. Scope of Study

Although there were many regional socioeconomic factors that influence nutrition status of children, this study only focused on several factors such as: health expenditure, poor household, woman illiteracy, access to safe water and sanitation, and access to health services that affect nutrition status of children under five, that was measured by HAZ score in all sub-districts, West Nusa Tenggara Province, Indonesia, 2008.

1.5. Hypothesis

The health expenditure, poor households, woman illiteracy rate, access to safe water and sanitation, access to health service and ethnic (dummy variable) can affect nutrition status of the children

1.6. Expected Benefits

- To identify in detail many regional socioeconomic factors affecting nutrition status of children, and to make recommendation for the solution
- This research focuses on determinants factor (underlying) that influence malnutrition in population with the spatial bases in sub districts. This information is very important for local government (Decentralization), because local government has the authority to take responsibility with their policy and program intervention, allocation, reallocation economic resources that they have. However, since district has limited resource to overcome this problem, it needs intervention of higher government level.
- Health status of the population is one of the most important factors in the process of economic development, these research also can used as a tool to measure success or failure of every district (decentralization) in providing the most basic needs of their community.

1.7. General Overview of West Nusa Tenggara Province

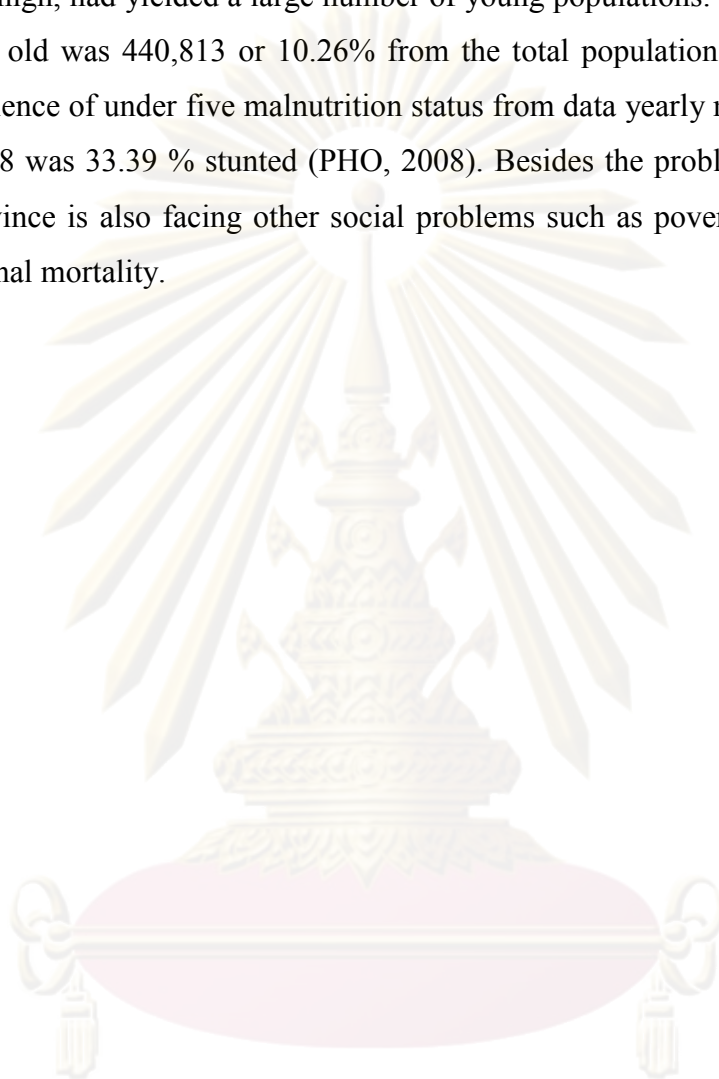
Indonesia is the country in South East Asia, most popular with Archipelago, consists of more than 17,500 islands, covering more than 2 million square kilometers of land, spanning a bridge from the continent of Asia to Australia. As the fourth most populous country, with 229.3 million people in the year 2008, Indonesia is home to more than 300 different ethnic groups with twice as much in its language diversity. Thus, Indonesia is enriched by various cultures and customs that also concerning to health behavior. Administrative regions in 2009 comprise of 33 provinces and more than 450 districts.

West Nusa Tenggara (NTB) Province is one of provinces in Indonesia that lies between 115'45 - 119 ° 10 E and between 8 ° 5-9 ° 5 LS. The north territory is the Java Sea, south by the Indian Ocean, east to west with Sepadan Strait and Lombok Strait. The total area of the whole is 49.32,19 km² consists of land and ocean. Lombok Island with the mainland area of 4738.70 km² (23.51%) and Sumbawa Island 15414.37 km² (76.49%).

West Nusa Tenggara Province consists of two prominent islands, Lombok and Sumbawa, and comprises of several small islands, and is divided into 10 Districts and has 116 Sub Districts and 911 villages. Lombok Island is mostly inhabited by Sasak ethnic (4 Districts and 1 City), while Sumbawa Island has two major ethnics, Samawa and Mbojo. Ethnic Samawa inhabits two districts (Sumbawa and West Sumbawa), and ethnic Mbojo inhabits in Bima, Dompu and Kota Bima (2 districts and 1 City). Unlike Bali Province, which has 92% Hinduism population and 95% ethnic Bali, NTB Province major population is Muslim (96%).

Each ethnic has different characteristics from the language, customs, arts and culture. For example, in teaching and educating children, marriage, etc are carried from generation to generation and applied in accordance with local wisdoms. Furthermore, local values are then became greatly affect the behavior and habits of local communities.

Data 2008 showed that the total population of West Nusa Tenggara amount to 4,367,559. In detail, 2,079,228 male and 2,288,331 female. The growth rate, which is relatively high, had yielded a large number of young populations. Population of under five years old was 440,813 or 10.26% from the total population (BPS-NTB, 2009), and prevalence of under five malnutrition status from data yearly monitoring nutrition status 2008 was 33.39 % stunted (PHO, 2008). Besides the problem of malnutrition, NTB Province is also facing other social problems such as poverty, infant mortality and maternal mortality.



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CHAPTER II

LITERATURE REVIEW

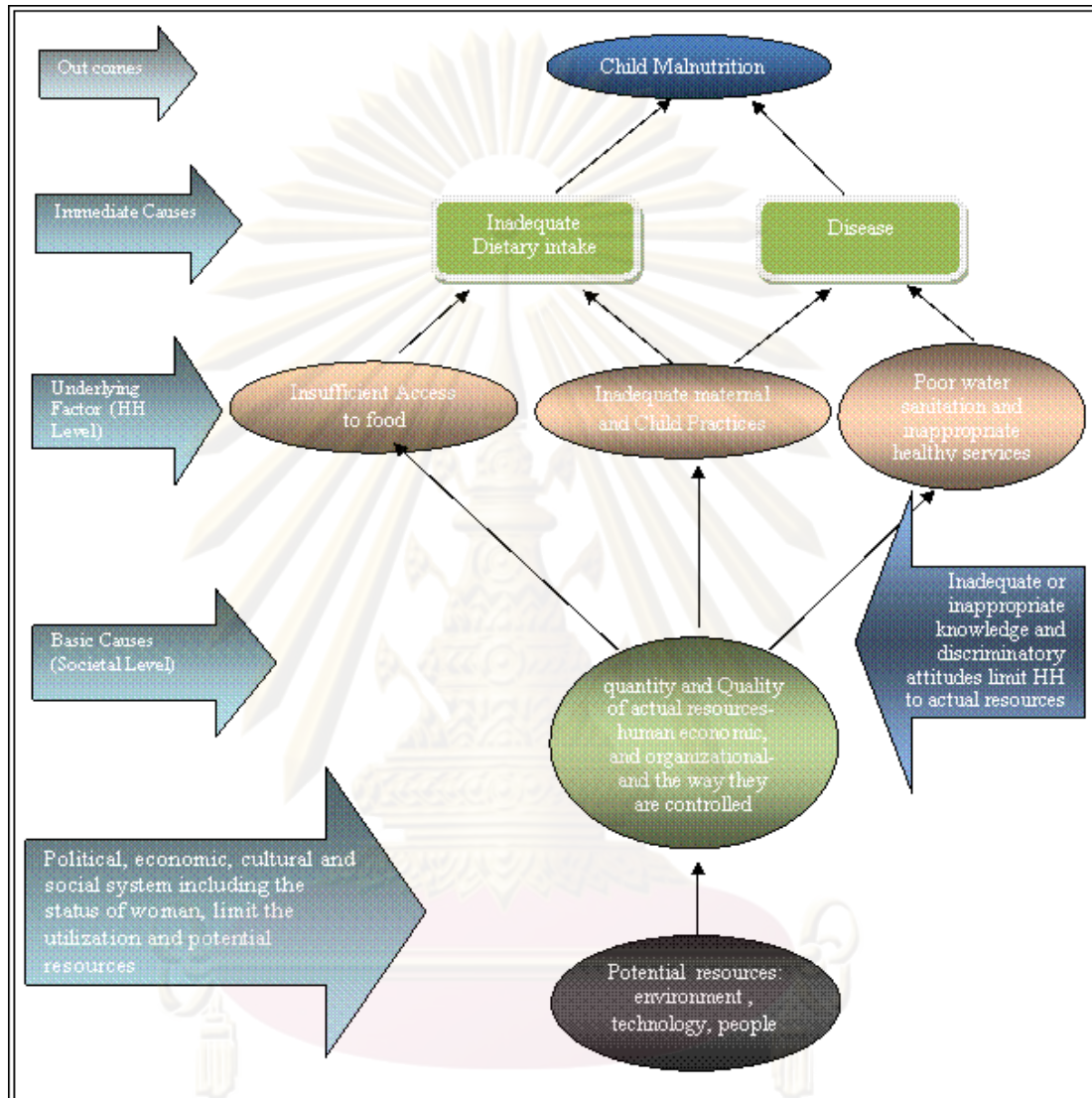
Health is central to social well-being and the most important factor in economic development. Wealth in the countries does not guarantee the best health in their population if the distribution of economic resources is not equal among them. Nutrition status of children is reflecting their overall output of health development and economic development. Economic development in that country could fail to achieve the target of MDG's when the nutrition status children is still high. Its means this country fails to fulfill the basic needs for their citizen.

2.1. Conceptual Framework the Determinants of Child Malnutrition

The output of overall health development in the country, region or in population can be seen by anthropometric indicators. Anthropometric indicators are useful to measure health status in both individual and population level such as in infant, under five years old, or adult. WHO (2005) explained, at an individual level, anthropometric indicators can be used to assess compromised health or nutrition well-being. While at a population level, anthropometry can be used to assess the nutrition status within a country, region, community, or socioeconomic group, and to study both the determinants and consequences of malnutrition.

The conceptual framework underlying in this study (Figure 1) is adapted from the United Nations Children's Fund's framework for the causes of child malnutrition (UNICEF 1990). Smith and Haddad (2000) have certain opinion that this framework is comprehensive; incorporating both biological and socioeconomic causes of malnutrition, and it encompasses causes at both the micro and macro levels.

Figure 2.1: Conceptual Framework for Determining the Prevalence of Malnutrition in Population



Source: UNICEF, 1998.

The *immediate determinants* of child nutrition status manifest themselves at the level of the individual human being. They are dietary intake (energy, protein, fat, and micronutrients) and health status. The immediate determinants of child nutrition status are and furthermore influenced by three *underlying determinants* that manifesting them at the household level. These are food security, adequate care for mothers and children, and a proper health environment, including access to health services (Engle, Menon, Haddad. 1999).

Poverty is the basic underlying determinants that affect on nutrition status. Family or a person is considered to be in poverty when the family cannot satisfy and fulfill adequate basic needs—such as food, health, water, shelter and primary education.

Finally, the underlying determinants of child nutrition (and poverty) are, in turn, influenced by *basic determinants*. The basic determinants include the potential resources available to a country or community, which are limited by the natural environment, access to technology, and the quality of human resources. Political, economic, cultural, and social factors affect the utilization of these potential resources and how they are translated into resources for food security, care, and health environments and services (UNICEF-a.b).

In measuring the determinants that affect on health status, there are two approaches have been undertaken: epidemiological approach, which measures the direct association between health inputs and outcomes (mortality and morbidity in population) (Mosley WH, Chen LC. 1984; Jekel, Elmore, Katz. 2006), and economics approach (Schultz, 1984, Drummond, et al. 1998)

2.2. Measurement of Child Nutrition Status

Anthropometric indicators are most commonly used as proxies for 'nutritional status' and are constructed from nutritional indices based on their age, height or weight of an individual.

Anthropometric measures for child nutrition are expressed as Z-scores, which correspond to standard deviations from the median of the reference population. Z-score for an individual i is calculated as follows:

$$Z\ score_i = \frac{X_i - X_r}{\sigma_r}$$

where X_i is an observed value for i in a target population. X_r are median and σ_r is Standard Deviation (SD) of the reference population, respectively (WHO, 2005).

A child whose HAZ, WHZ and WAZ is more than 2 SD below the median of the reference population are classified as ‘moderately or severely’ stunted, wasted and underweight respectively. Those whose HAZ, WHZ and WAZ is more than 3 SD below the median are classified as ‘severely’ stunted, wasted and underweight respectively (WHO, 2005b).

Table 2.1: Advantages and Disadvantages Z-score Measurement and The Reflecting Indices of Nutrition Status in Children

No.	Z - Score	Advantages	Disadvantages	Reflecting Indices
1.	Height-for-age	<ul style="list-style-type: none"> • This index is an indicator of past under nutrition or chronic malnutrition. • For children below 2 years of age, the term is length-for-age • Associated with a number of long-term factors including chronic insufficient protein and energy intake, frequent infection, inappropriate feeding practices and poverty. • Association with long term mortality risk • Best predictor human capital and mortality • indicator to analyze sustained nutritional deficit 	<ul style="list-style-type: none"> • It cannot measure in short term changes in nutrition status. • Not recommended for monitoring as it does not change in the short term such as 6 - 12 months 	Stunted reflect Low length-for-age: <ul style="list-style-type: none"> • As indicator of past growth failure and • Reflecting both situation long term and short term • In children over 2 years of age, the effects of these long-term factors may not be reversible. • Useful as a population indicator • useful in order problem analysis in designing interventions. • Helpful for clinically diagnosis. • Useful for evaluation purposes
2.	Weight-for-height:	<ul style="list-style-type: none"> • To identify children suffering from current or acute under nutrition (short term). • Useful for screening or targeting purposes in emergency settings • Useful when exact ages are difficult to determine (not requiring age data). • Weight-for-length (in children under 2 years of age). • Appropriate for screening children at risk and • For measuring short-term changes in nutrition status examining short-term effects such as seasonal changes in food supply or short-term nutritional stress brought about by illness. • Causes include inadequate food intake, incorrect feeding practices, disease, 	<ul style="list-style-type: none"> • Not recommended to evaluate program in long term. • Not recommended for evaluation of change in a population since it is highly susceptible to seasonality. • Not useful for long term action policy 	Wasting is the result of a weight falling significantly below the weight expected of a child of the same length or height. <ul style="list-style-type: none"> • Indicates current or acute malnutrition resulting from failure to gain weight or actual weight loss. • starvation or severe disease (in particular diarrhea) • Sensitive on seasonal patterns that associated with changes in food availability or disease prevalence in individual or population.

		<p>and infection or, more frequently, a combination of these factors.</p> <ul style="list-style-type: none"> • Reflecting Outbreak of disease. • Short term action • As an early warning for foods stock policy. 		
3.	Weight-for-age	<ul style="list-style-type: none"> • Useful for a specific age. • reflect both past (chronic) and/or present (acute) under nutrition 	<ul style="list-style-type: none"> • Least effective predictor for mortality 	<p>Underweight reflect Low weight-for-age:</p> <ul style="list-style-type: none"> • Very common to monitoring growth changes in the magnitude of malnutrition over time. • composite measure of HAZ and WHZ difficult to interpret • commonly used to refer to severe or pathological deficits • confound the effects of short- and long-term health and nutrition problems.

Source: WHO, 2005 b; Cogill, 2001; Beaton, et al, 1990; Young and Jaspar, 2009; Pelletier, 1994; Onis, 2000.

Based on table above and looking at the problem having been faced in this province that we already discussed in the first section, in this research we use HAZ indicator. Because, HAZ indicator is the best indicator that reflects both in the long term and short term effect, and considered indicative of chronic and acute malnutrition. This indicator also reflects the poverty in the society and has strong relationship with mortality and morbidity. NTB is the one province in Indonesia that has highest mortality in infant and under five children. More than 10 year and along 5 years performance nutrition status are stagnant and Poverty Gap Index remains high.

2.3. Health Spending and Health Status

In economics, among of the roles of government are allocation and reallocation of economic resources. Government has a prime responsibility to ensure provision and budget allocation to improve the prosperity of the citizens, at least the spending on public health services. In the poor population the role of government is very important in order to distribute (or redistribute) their income (GDP) to reduce poverty gap and ensure the equity, equality, and affordability among their citizens to

fulfill their basic need such as, food, education, shelter, health, etc. Mason and Gillespie (1990) stated that improvement on nutrition status was associated with GDP growth. To establish this theory, a research in Tanzania found that if country like Tanzania can achieve a stable 5% per capita income growth, underweight could declined around 20% (Alderman, Hoogeveen, Rossi, 2005).

The emphasis and sufficiency of public spending on primary health care is generally justified on the basis that that spending can improve public health status. WHO has recommended that a country spend 5% of GDP on health program (but this is not formally approved from WHO, see Savedoff, 2003). Many studies try to analyze the relationship between public spending in health and health outcome (Filmer and Pritchett, 1997; Filmer, Hammer and Pritchett, 1998), but the relationship of public health spending to health status as measured by infant mortality or under five (child) mortality is quite small or insignificant statistically. Cross sectional data for 50 developing and transitional countries also showed little evidence to support claim that public spending improves education and health indicator (Gupta, Verhoeven, Tiongson, 1999). On the other hand, a study carried out by Rajkumar and Swaroop (2008) found that public health spending lowered child mortality rates more in countries with good governance. In addition, that research found that public spending on primary education becomes more effective in increasing primary education attainment in countries with good governance. In general, public spending in fact has no impact on health and education outcomes in poorly governed countries.

2.4. Poverty and Nutrition Status

Nutrition status is usually directly associated with food intake, which, in turn, depends on family income. Hence, family or household with less income or poor will lead to insufficient intake of food and; furthermore, that is regarded as a major cause of low level of health status. Poverty exists if income in the family is not sufficient and cannot reach and fulfill their basic needs for daily life, and this condition will lead to the increase of inequality and inequity among them. In the conceptual framework,

an inter linkage between poverty and nutrition was clearly discussed by Islam; in Poverty and Its Effect to Nutrition (see Islam, 1997).

An increasing income in a family will reduce poverty and, in turn, the family can access health service and, furthermore, that family will get better health. Many research in Indonesia, Ecuador and India found that poorer household and economic status in family had significant affect on malnutrition (Saadah, et al 1999; Larea, Montalvo, Ricaurte 2005, Gupta, et al 2004). Study using household survey data from 12 countries estimated the magnitude of the response of WAZ to income growth as shown below. If income per capita growth for 2,5% per annum, the average reduction of underweight children would between 27%-34% (Alderman, Hadinot, Kinsey, 2006).

2.5. Education of Woman and Child Nutrition Status

Mother's education is very important factor and can affect on child health status. Schultz (1984) identified at least five distinct ways that mother's education might affect child health:

- Education may affect the productivity or effectiveness of the health inputs used in the production of child health.
- Education may affect perceptions about the best allocation of the health inputs.
- Education may increase total family resources.
- More educated women may assign a higher value to their own time, particularly, but not only, if they work in the market and receive a higher wage rate.
- Education may residually affect preferences for child health and family size, given total resources, prices, and technology.

In many research the relationship between women's education and child nutrition status are very commonly discussed. For example, Smith, et al (2003) research in developing countries explained the relationship between education of woman and malnutrition status of children. Study in Indonesia and Andean Region -

Ecuador, showed malnutrition was also higher among children from poorer household and those whose mothers' have little education (Saadah, 1999; Larea,2005). A comparative study on maternal malnutrition in ten sub-Saharan African countries and a study in Ethiopia showed that the higher the level of education has positive relationship with the lower proportion of undernourished women (Girma and Genebo, 2002) The empirical results showed that higher women's status has a significant, positive effect on children's nutrition status. Because woman had stronger position in decision making on allocation of income, provision of child care and health seeking behaviors (Smith, et al. 2003; Quisumbing and Maluccio, 2003).

2.6. Access on Health Services and Nutrition Status

The availability of an access to health facilities in the region is important factor to help improve health status of the populations as well as health status on the children. Usually, in every health facilities and medical work force carry out many programs and intervention activities in order to improve public health status, such as health promotion program, health prevention, surveillance of disease and community empowerment. That program can lead to increasing the utilization of health services, which is an important input into child nutrition and child health.

Comprehensive approach, evidence base and well institutionalized establishment on health program and nutrition intervention in community is effective to improve health status on children and reducing malnutrition. Study performed by Bhutta, et al (2008) found that program promotion of breastfeeding, micronutrient interventions, promotion of hand washing and reducing the burden of malaria in pregnancy could reduce stunted at 36 months by 36%; mortality between birth in 36 months by about 25%; and disability-adjusted life-years associated with stunted.

Institutionalization of supply side in health services such as, availability of health service and health work force in the village was also important factors on health status. Research in Bangladesh proved that availability of health centre would reduce the overall incidence of underweight children in that village from 53.5 percent

to 51.9 percent. This research also explained that utilization of health service is greater on the poor people (Doelalikar, 2004). Mason, et al. (1990), also found that reducing exposure to infection, come down with home visits by health workers, and better utilization of health services.

2.7. Access on Water Sanitation and Nutrition Status

Water and sanitation program is very important factor in connection with hygiene behavior change. This program has significant effects on population and health, i.e.: by reducing a variety of diseases that caused by bad environments. Implementation of this program can improve health status, which in turn, lead to reduction of morbidity and mortality as well as improving nutrition status. Because, increasing the quantity of water in an area allows people to do better hygiene practices. Family without clean and pure water and poor sanitation is susceptible of infectious diseases especially children. UNICEF (1990), warned that inadequate safe water and sanitation can increase the probability of infectious diseases and indirectly cause certain types of malnutrition. Bence, et al. (2004) carried out a comparative study in several developing countries and in Ethiopia. He showed that unprotected water source and unavailability of latrine were associated with low child stature.

2.8. Measuring Inequality on Nutrition Status

Government has the major role to take responsibility to reduce poverty by supplying basic public services delivery such as safe water, education, health services, and security. Because, according to MDG's program, education and health services are deemed fundamental human rights. The key dimension of public service delivery is equity among citizens that define as "equal treatment for equal medical need" and equality (O'Donnell, et al. 2008).

Inequality exist in many dimension such as age, gender, ethnic/race, region, geography, socio economic status, income, etc (Kalipeni, 1993. Zere and McIntyre,

2003; Murray, Gakidou, Frenk 1999; Doorslaer, et al 1997, Bitran, et al 2000). In addition, that condition will affect on health status.

Many literatures discussed how to measure inequality in health sector. There are two methods to measure inequality; firstly, using index decomposition (O'Donnell, et al 2008. Cowel,1998. Murray,et al, 2000, Huber, 2008, Peng, et al, 2010, Wagstaf, 2000); and, secondly, using comparisons among quintile (Makinen, et al 2000).

The purpose of decomposition analysis in a region usually is to see what comes out of any changes in a group or as a whole in the region. The definition of a group in this context, is measuring inequality in group between and within restriction areas such as geography of northern and southern regions, occupational groups, educational groups, group of commodity sectors, age groups, etc. While the whole group, is the total value in the overall population. In this study the value of a characteristic decomposition is the percentage of stunted children under five years old in the sub districts level in West Nusa Tenggara Province

While inequality among quintile analysis, is based on the results of grouping the frequency distribution of the entire population. Normally, a frequency distribution divides into five parts of the sample population. The resulting value in each group is standardized in relation to a standard normal distribution, with a mean value equal to zero and with standard deviation equal to one. Furthermore, these scores are used to create the break points, which indicate the level of welfare in each quintile group. The form groups of quintile are: lowest (quintile 1), second (quintile 2), middle (quintile 3), fourth (quintile 4), and highest (quintile 5).

Measurement of inequality originality used to measure the level of individual income or in community, at least five principles that used to assess the level of inequality. Among them includes the transfer principle, scale of independence, population of independence, addition principle and aggregates decomposable. Shorrocks, (1980), argues to measure the inequality in a class or group with axiom independence of scale and population independence. Axiom independence of scale,

connote if all incomes change uniformly proportional in a group, the inequality measurement in that group also did not change. Whereas, axiom independence of population means, the index of inequality remains unaffected if the proportional number of members added at all level of income.

There are three orders developed by Shorrocks, in order to measure index inequality in a group as mentioned below:

$$I_0 = \frac{1}{n} \sum_{i=1}^n \log \frac{\mu}{y_i}$$

In the index order of 0 (I_0) as the equation above, it can be seen that there more weight in income groups under the average of the income distribution of a group (average data in a group divided by the income of an individual), it means that the value of the index of inequality is not sensitive.

$$I_1 = \frac{1}{n} \sum_{i=1}^n \frac{y_i}{\mu} \log \frac{y_i}{\mu}$$

Meanwhile, in the index order 1 (I_1) above, it can be seen that this equation gives equal weight to all values in a distribution group. However, the equation cannot measure the distribution between groups. This equation only can used to analyze the index of inequality in the distribution of one group alone.

$$I_2 = \sum V_g \lambda^2 I_{2g} + \frac{1}{2} \sum V_g (\lambda_g - 1)^2$$

In the second order equation (I_2), it will explain that the value of the quadratic equation is more adequate with the axiom scale of independence and population independence. Because, changing in an individual unit does not come to change the

overall index value. This equation can also be used to calculate the index within the group and between groups.

Based on the explanation above, in this study, I perform decomposition analysis among two prominent Lombok Island and Sumbawa Island in West Nusa Tenggara Province. In addition, to analyze inequality of malnutrition status and socioeconomic condition between two islands and groups within the island, I analyze population decomposition equation (Sarntisart, 2004) base on Shorrocks index 2nd order (Shorrocks, 1980).

$$I_2 = \sum V_g \lambda_g^2 I_{2g} + \frac{1}{2} \sum V_g (\lambda_g - 1)^2$$

Where :

V = Population share of group ($g = N_g/N$)

λ = Mean incidence stunted of group ($g = M_g/M$)

I = Inequality within group

N_g = Number of population in group

N = Total number of population

M_g = Mean incidence stunted of group g

M = Overall mean incidence stunted

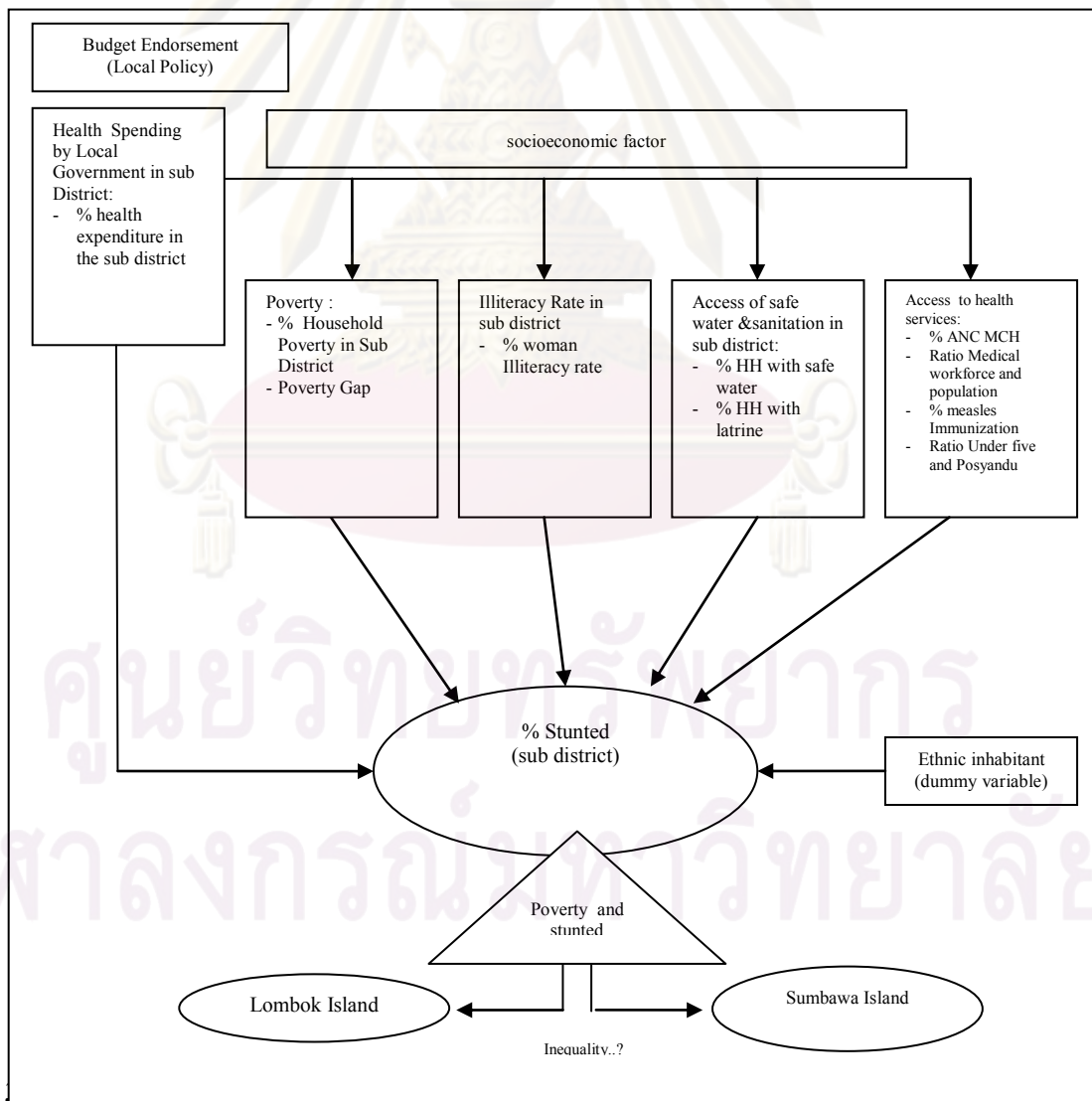
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CHAPTER III

RESEARCH METHODS

This study is aimed at analyzing the effect of regional socio economy on nutrition status of under five children in West Nusa Tenggara Province, Indonesia. Many regional socio economic factors can affect nutrition status of children, i.e.: health expenditure, poor households, woman illiteracy, access of water sanitation, access to health service and ethnic.

3.1. Research Conceptual Framework



3.2. Research Design

This study is a descriptive research and cross sectional, aimed at identifying relationship between regional social economic factors and analyzing inequality nutrition status between two prominent islands of children under five years old in West Nusa Tenggara Province.

3.3. Population and Sample

Target population in this research is under five children years old who lived in all sub districts of West Nusa Tenggara Province (116 Sub Districts).

3.4. Data

Data used in this research is from many sources. Data nutrition status (HAZ score) is from Provincial Health Office (PHO). After decentralization era every year PHO and Statistic Office have collaboration called “Pemantauan Status Gizi” (Monitoring Nutrition Status) in all sub districts and the data will represent the sub district, district and province level. This report contains information of nutrition status with HAZ, WAZ and WHZ score in sub district, district and province level. According this research, we only focus on data 2008.

Data poor households and poverty gap, woman illiteracy rate, safe water and sanitation, and ethnic's population are from District Statistic Office (DSO) and Province Statistic Office (PSO). Every year National Statistics Office carries out National Socioeconomic Survey (SUSENAS). This survey observes many aspects such as, health, employment, education, socioeconomic, health utilization, etc. Sampling technique that used in this survey is Double Stage Technique Sampling. First stage using technique Probability Proportional to Size to establish block census (villages) and second step using Systematic Random Sampling to choose household became to be sample amount 16 household per block census. According to this research, I used data block census in every district year 2008, as a reference to

calculate poverty gap and income in population among sub district. Besides, every year local governments (Province and every district) collaborate with DSO and PSO to arrange yearly data book in order to analyze socioeconomic and demography in the local level (Kecamatan Dalam Angka/Kabupaten Dalam Angka/Provinsi Dalam Angka). This data represent a data in every sub district for district level respectively.

Data of health public spending is taken from the analysis of District Health Account (DHA) that performed in District Health Office (DHO) since last 3 years. In that data, health expenditure includes hospital spending, so we make an adjustment to exclude hospital expenditure. To crosscheck the accuracy of the financial data we also analyze and compare with “Laporan Tahunan Pemerintah Daerah” (Government Yearly Financial Report) from home affair office in every district.

Health service access data (ANC, Immunization, etc.) is a monthly routine data that yielded from reporting and recording system of health service, as a form of monitoring and evaluation performance health service in every health facilities. Data obtained is started from health services in sub villages (Posyandu), collecting in the Puskesmas Pembantu/Poskesdes (villages level) and then in the Health Centre (Puskesmas - sub district level) respectively. Due to wide area reasons, sometimes sub district has 2 or 3 health facilities (Puskesmas) that I combined that it represent sub district level as a unit analysis in this research.

Eligibility Criteria that used to assess each sub-district is as follows:

Inclusion criteria

Sub district with inhabitant ethnic population at least 80% = ethnic majority (for dummy variable).

Exclusion criteria

- New sub district (defined and ratified by the government After January 2009).
- Sub District with population ethnic majority < 80%, excluded from analysis ethnic (dummy variable).
- Spending in hospital

3.5. Data Collection and Measurement of Variables

Variables:

Dependent variable

Nutrition status of Children (Percentage of stunted incidence of under five children in every sub district)

Independent variable

- Health expenditure in sub district by own local government budget (district-APBD)
- Households poverty incidence in sub district
- Woman illiteracy rate in sub district
- Access household to safe water and sanitation in sub district
- Access to health services in sub district
- Ethnic (dummy variable)

Operational definition and measurements

a. Percentage of stunted incidence of children

Prevalence of nutrition status under five children years old in population in the sub district measured by HAZ Score (WHO, 1981). HAZ Score criteria in sub district (Normal \geq - 2 SD and Stunted $<$ -2 SD in population).

b. Percentage health expenditure by local government

Percentage of sum budget health program expenditure that allocated in the sub district divided by total Expenditure own local government (APBD) in district (WHO. 1981).

c. *The household poverty incidence (Percentage of poor households) in sub district*

The number of poor households, based on criteria set by National Statistic Office in that sub district, is divided by total household in the sub district.

Poverty Gap is adds up the extent to which individuals/household on average fall below the poverty lines (expressed it as a percentage of the poverty line).

d. *Percentage of woman illiteracy rate in sub district*

The number of illiteracy women 14 to 55 years old in the sub district (survey and classification set by National Statistical Office and District Education Office) divided by total amount women 14 to 55 years old in the sub district.

e. *Percentage of household with safe water and sanitation in sub district*

The number of household with safe water in the sub district, and number of household with latrine toilet (survey and classification set by District Statistical Office and District Health Office) divided by Total household in that sub District (Billig, et al, 1999).

f. *Percentage access to health services in sub district.*

Availability of infra structure of health services in every sub district as measured by performance of coverage antenatal care services in that sub district, ratio of population with medical work force (doctor and midwives) in sub district, performance of coverage measles immunization in sub district, and ratio under five years old and Posyandu activity in that sub district (MOH-RI). Posyandu is community empowerment in health sector with some health volunteers in every sub village; nutrition program is one of the activities in the Posyandu. (=Pos pelayanan terpadu=integrated service point).

g. *Ethnic (dummy variable)*

Sub district with majority population (more than > 80%) are assumed and classified as homogenous, it means that sub district is 1 (one) ethnic. In this study the variable ethnic used for analysis dummy variables, as follows:

Dummy 1:	Samawa	→ 1
	Other	→ 0
Dummy 2:	Mbojo	→ 1
	Other	→ 0
Dummy	1 and 2 = 0	

3.6. Research Location

Research will be held in 10 Districts and 116 (all) sub districts as a unit analysis in West Nusa Tenggara Province, Indonesia.

3.7. The Data Classification and Source

The types of data that to be collected in this research are include follows in Tables 3.1.

Table 3.1 : Data Classification and Source

No.	Data	Classification	Office
1.	Nutrition status (prevalence of stunted)	Secondary	DHO-PHO
2.	Health expenditure in sub district	Secondary (adjusted)	DHO-Home Affair
3.	Poor households/Poverty Gap	Secondary (adjusted)	Statistic
4.	Woman illiteracy rate - % woman illiteracy rate	Secondary	Education & Statistic
5.	Access of safe water & sanitation in household	Secondary	DHO & Statistic
6.	Access to health services: - % coverage ANC MCH - Ratio Medical workforce - % measles Immunization - Ratio under five and Posyandu	Secondary Secondary (adj) Secondary Secondary (adj)	DHO DHO DHO DHO
7.	Sub district with ethnic majority	Secondary	Statistic

3.8. Methods of Data Collection

- Pay visits in District, review performance program, and evaluate accuracy data.
- Review document of budgeting and report of performance program base on data classification
- Interview with programmer/officer if data is not clear yet

3.9. Data Analysis

3.9.1. Descriptive Statistic

Describe the characteristic of Sub District: nutrition status, nutrition and health expenditure, poor households, woman education, access to safe water and sanitation, and access to health services. The mathematical analysis is a simple description such as, mean, frequency and cross tables between variable.

3.9.2. Bivariate Analysis

Initially we used correlations analysis to analyze relationship between variable stunted in population, health expenditure and other socioeconomic variable such as poor households, woman illiteracy, access on safe water and sanitation, access to health services.

3.9.3. Multivariate Analysis

In order to point out the relationship between regional socioeconomic factor and prevalence of nutrition status of children under five years old (stunted), the multiple regression models will be estimated by the method of OLS (Ordinary Least Square). We also carry out multicollinearity diagnostic to check independent variables that showed high levels of multicollinearity with other independent variables dropped from analysis.

The model of research:

Prevalence $(stunt)_i = f$ (health expenditure, incidence poor households; poverty gap, woman illiteracy; access of safe water and sanitation; access to health services, ethnic).

$$\text{Prevalence } (stunt)_i = \beta_0 + \beta_1 \text{ expd}_i + \beta_2 \text{ povrty}_i + \beta_3 \text{ pgap}_i + \beta_4 \text{ willitr}_i + \beta_5 \text{ swater}_i + \beta_6 \text{ sanit}_i + \beta_7 \text{ ANC}_i + \beta_8 \text{ measles}_i + \beta_9 \text{ hlthwkr}_i + \beta_{10} \text{ Posyandu}_i + \beta_{11} \text{ D1}_i + \beta_{12} \text{ D2}_i + u_i$$

Expected sign of coefficients of regression for each sub district characteristic:

No.	Variables	Coefficient
1.	Health expenditure	-
2.	Households poverty incidence	+
3.	Poverty gap	+
4.	Woman illiteracy	+
5.	Household with safe water	-
6.	Household with sanitation	-
7.	ANC coverage	-
8.	Measles immunization coverage	-
9.	Ratio health worker and population	+
10.	Ratio Posyandu and under five children	+
11.	Dummy - 1	+/-
12.	Dummy - 2	+/-

3.9.4. Test for Significance of Each Factor

For the model analysis, the hypothesis that a coefficient was different from zero by using t test and F test. The hypothesis was:

$$H_0: \beta_i = 0$$

$$H_1: \beta_i \neq 0$$

If the value of F test is *less* than critical value or p value *greater* than 0,05 that means we have no reasons to reject the null-hypothesis or in other word the

coefficient is equal to zero. If coefficient are significant that means that independent variable can affect dependent variable.

$$F = \frac{ESS/(k-1)}{RSS/(n-k)}$$

In which :

- ESS = Error Sum of Square
- RSS = Residual Sum of Square
- K = Number of variable
- N = Number of observation

If $F > F_{\alpha}(k-1, n-k)$, its mean reject H_0
 Otherwise, accept.

3.9.5. Analyzing Inequality of Nutrition Status

To analyze inequality of malnutrition between the two islands (Lombok and Sumbawa) and to analyze inequality malnutrition within the island, we used equation Population Decomposition:

$$I_2 = \sum V_g \lambda^2 I_{2g} + \frac{1}{2} \sum V_g (A_g - 1)^2$$

Where :

V = Population share of group ($g = N_g/N$)

λ = Mean incidence stunted of group ($g = M_g/M$)

I = Inequality within group

N_g = Number of population in group

N = Total number of population

M_g = Mean stunted incidence of group g

M = Overall mean stunted incidence

CHAPTER IV

RESULT AND DISCUSSION

According to the methodology discussed in the previous chapter, this chapter will show result discussion related with the aim of study set in the first chapter.

4.1. The Socioeconomic Characteristics in West Nusa Tenggara Province

The following Table 4.1 will give an illustration the distribution of district/city and the number of sub-district in the each district/city in NTB Province Years 2008. From the table it can be seen that, although the number of districts in the two islands give equal number, but has different number of sub-district. In Lombok, there are 53 sub districts and Sumbawa Island there are 63 sub districts. The ethnic majority in the column below is a resident of the majority (> 80%) of the total population.

Table 4.1 District/City and Sub District Distribution between Two Islands in West Nusa Tenggara Province, 2008

Prominent island	Ethnic majority	District/City	Number of sub district 2008
Lombok	Sasak	Mataram	6
	Sasak	West Lombok	10
	Sasak	North Lombok	5
	Sasak	Central Lombok	12
	Sasak	East Lombok	20
Sumbawa	Samawa	West Sumbawa	8
	Samawa	Sumbawa	24
	Mbojo	Dompu	8
	Mbojo	Bima	18
	Mbojo	Bima City	5
NTB (PROVINCE)			116

Table 4.2 presents the descriptive statistics for the analysis. The data includes the information about 116 sub districts and all variable research dependent and independent variables.

Table 4.2 : Descriptive Statistics of The Socioeconomic Characteristics in West Nusa Tenggara Province by Sub Districts, 2008

No.	Variable	N	Minimum	Maximum	Mean	Standard deviation
1	Percentage stunted in sub district	116	11.67	66.13	34.28	10.86
2	Percentage health expenditure in sub district	116	0.05	0.46	0.17	0.08
3	Poverty gap in sub district	116	2.654	5.985	4.6	0.66
4	Household poverty incidence (% of poor household) in sub district	116	9.61	83.18	40.45	15.81
5	Percentage woman illiteracy rate in sub district	116	8.15	41.03	22.55	7.14
6	Percentage household with safe water in sub district	116	10.24	86.3	54.17	20.95
7	Percentage household with latrine sanitation in sub district	116	12.75	97.54	50.09	20.19
8	Percentage coverage antenatal care in sub district	116	25.95	98.06	80.69	13.13
9	Percentage coverage measles immunization in sub district	116	36.95	99.12	87.69	11.18
10	Ratio health worker (doctor and midwives) in sub district	116	627.73	15,210	3,431	15.81
11	Ratio Posyandu and under five children in sub district	116	24	177	85.4	32.61

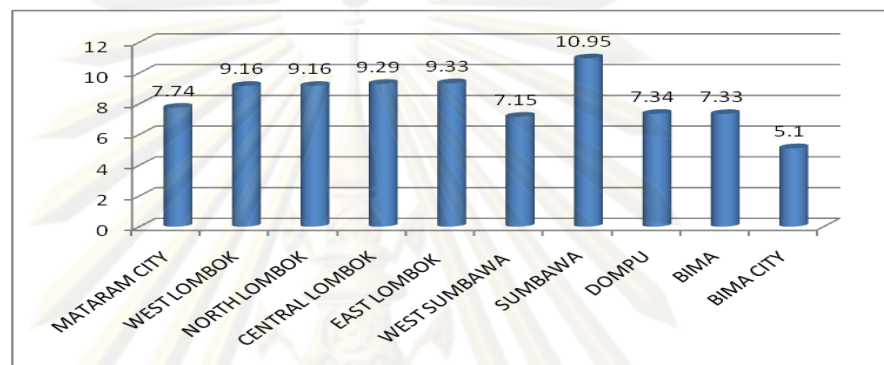
More detailed reviews of the table above can be seen in the discussion on each of the following sub chapters which include prevalence of poverty, health financing, sanitation and clean water, education of women and access to health services and malnutrition, in accordance with the purpose of this study.

4.1.1. Health Expenditure

Proportion of public expenditure in health sector (Hospital and District Health Office) by the total budget expenditure in every district also remain low, the recommendation from Ministry of Health stated that proportion of budget allocation in health sector should be at least 15% from total budget expenditure in every district/city. In 2008, the highest proportion health expenditure is in Sumbawa District (10.95%) and the lowest is in Bima City (5.1%), see Figure 4.1.

Distribution of health budget allocation in sub district is depend on number and condition of health centre (Puskesmas, Puskesmas Pembantu/Poskesdes) and its operational cost (number of health worker, number of village, coverage area, etc).

Figure 4.1 : Percentage of Health Expenditure by Total Expenditure in Districts, 2008



Source: data-set

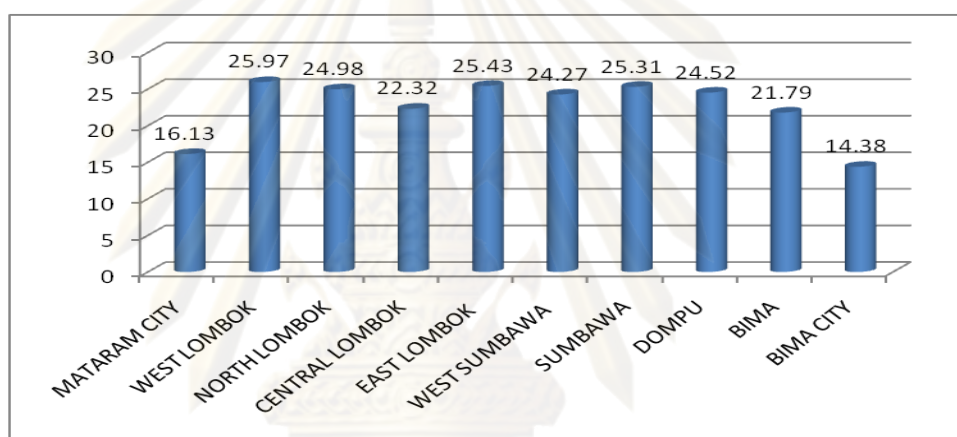
The lowest proportion of public expenditure on sub district is in Moyo Utara-Sumbawa (0.05%) or IDR 254,961,895.86. The highest is in Jonggat sub district-Central Lombok (0.46%) or IDR 3,006,204,645.00. Because, in that sub district has 2 health centre and 3 new Poskesdes (Village Health Centre). The mean of proportion of public expenditure in sub district 2008 is 0.17% or IDR 928,377,041 with standard deviation 0.083%, see previous Table 4.2.

4.1.2. Poverty in West Nusa Tenggara Province

Poverty is the most important problem in West Nusa Tenggara Province, number of poor population in year 2008 is still high, approximately around 1.834.122 persons (41.99%) or in the 559.280 household (40.45% from total household). The average poverty incidence in urban is 28.84% and in rural 18.40%. Poverty line in West Nusa Tenggara Province in 2008 is IDR 167,536.00 (poverty line for food IDR 129,222.00 and non food is IDR 38,314.00). Poverty Gap Index (P1) in 2008 is 4.59 with Severe Poverty Index (P2) is 1.28.

There are incisive distinction distribution of poor households in the city and all districts in West Nusa Tenggara Province. In Bima and Mataram City, the percentage of poor households reported at 14.38% and 16.13%, whereas in other district approximately 21.79% until 25.97%. The highest poverty is in West Lombok District, 25.97% and the lowest is in Bima City. Detail distribution the percentage of number poor households in West Nusa Tenggara Province is shown in Figure 4.2.

Figure 4.2 : Percentage of Poor Households in NTB Province by Districts, 2008



Source: BPS-NTB

Most of sub district has higher incidence of poor household. There are only 8.6 % of sub districts with the percentage the poor households less than 25%. Besides, 40.5% sub districts with incidence of poverty more than 50% of household in population. Sub district with the lowest 2.654 poverty gap (P1) is in Batu Layar (West Lombok) and the highest is in Belo - Bima (5.985) with standard deviation 0.66. The percentage of poor households in population in every sub district showed in Table 4.3.

Table 4.3 : The Percentage of Poor Households by Sub District, 2008

Percentage of poor household in population	Number sub district	Percent	Percent cumulative
<25.00	10	8.6	8.6
25.01-50.00	59	50.9	59.5
>50.01	47	40.5	100.0
Total	116	100.0	

4.1.3. Woman Education

Low of women education also major problems in West Nusa Tenggara Province. Table 4.4 shows that 35 sub districts have population with woman illiteracy more than 25%. Highest percentage of woman illiteracy in population 41.29% in Buer sub district- Sumbawa and the lowest 8.15% in Cakranegara-Mataram. Buer is one of the outlying sub district in Sumbawa District, while Cakranegara is one of the sub district in the capital city. Average the woman illiteracy rate is 22.55% with standard deviation 7.14%. The ratio of basic education facilities and population in sub district highest is in Tambora- Bima 1 facilities with 29,247 population and lowest in Sembalun - East Lombok with 1.307 population. The mean of basic education facilities and the populations is 8,385 with standard deviation 4,039. Distribution of proportion woman illiteracy in every sub districts are as follows.

Table 4.4 : The Percentage of Woman Illiteracy Rate in Population by Sub District, 2008

Percentage woman illiteracy rate in population	Frequency	Percent	Percent cumulative
<25.00	85	73.3	73.3
25.01-50.00	31	26.7	100.0
Total	116	100.0	

4.1.4. Health Access

The coverage basic health services especially in Antenatal Care (ANC) for pregnant woman and immunization services for children in every sub district show good indication. There are more than 64% sub districts has coverage antenatal care service more than 80% on pregnant population. Sub district with the highest coverage of ante natal services is Brang Rea-Sumbawa with cover 98.06% of pregnant population and the lowest 25.95% in Orong Telu - Sumbawa. The mean coverage of ANC services in NTB Province is 80.69% with standard deviation 13.13%.

In the program measles immunization services, there are more than 87% of sub districts has coverage immunization more than 80% childrens in population. Sub district with highest coverage measles immunization services in Sikur - East Lombok with cover 99.12% of children's in population and the lowest 36.95% in Sekongkang- Sumbawa. The mean coverage of immunization services in NTB Province is 87.69% with standard deviation 11.18%. In detail showed in Table 4.5.

Table 4.5 : Coverage of ANC and Measles Immunization Services by Sub District, 2008

Coverage health services in sub district	Antenatal care		Percent cumulative	Measles immunization		Percent cumulative
	Sub district	Percent		Sub district	Percent	
<80.00	42	36.2	36.2	14	12.1	12.1
80.01-90.00	46	39.7	75.9	40	34.5	36.2
>90.01	28	24.1	100	62	53.4	100.0
Total	116	100.0		116	100	

The distribution of health worker (general doctor and midwives) also shows good indication, its mean access community to health service equal enough in every sub district. Table 4.6 shows the number of sub district with ratio health worker less than 5,000 populations among 98 sub districts (84.5%). Majority sub district that have ratio more than 5.000 populations are in the remote sub district. Placement of health worker majority in Maluk (Sumbawa) one health worker with 627 populations and the scarce health worker in population in Sembalun - East Lombok with 15,210 population. The mean of health worker and population are 3,431 with standard deviation 15,81 person.

Table 4.6 Ratio Health Worker in Population by Sub District, 2008

Ratio health worker and population	Number sub district	Percent	Percent cumulative
<5,000	98	84.5	84.5
5,001-10,000	18	15.5	100.0
Total	116	100.0	

4.1.5. Access on Safe Water and Sanitation

The access of household on safe water and sanitation in every sub district also still low. There are only 10 sub districts has household with safe water more than 75.00%. The highest households with of safe water in population is 86.30% Labuhan Badas-Sumbawa and the lowest 10.24% in Sekotong-West Lombok. The mean coverage of household with safe water in NTB is 54.17% with standard deviation 20.95%.

The access of household with sanitation more than 75% in population only 17 sub districts. There are only 44% sub districts with majority population using latrine sanitation more than 50.01% . The highest coverage safe sanitation in population 97.54% in Cakranegara-Mataram sub district and the lowest 12.75% in Palibelo-Bima. The mean of coverage households with latrine sanitation in NTB Province is 50.09% with standard deviation 20.19%.

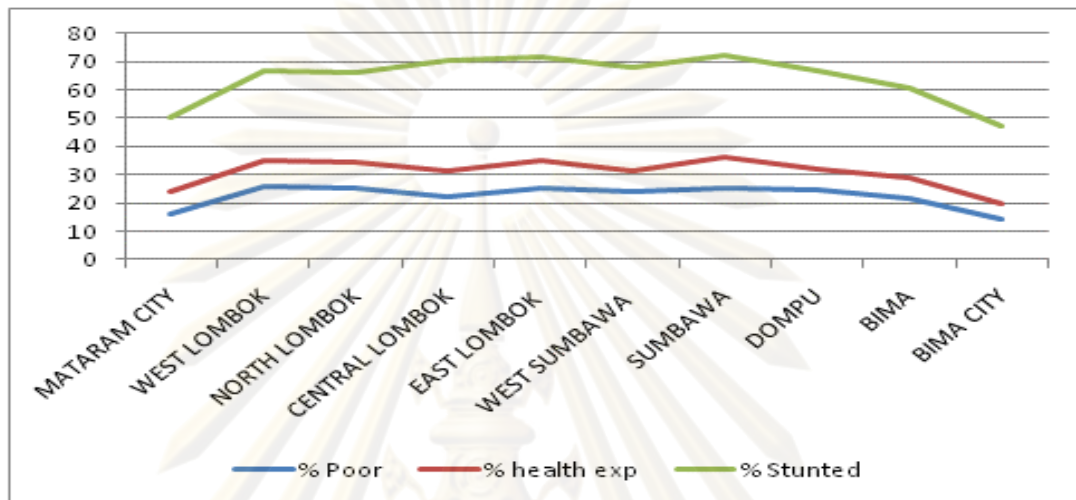
Table 4.7 : Coverage of Household with Safe Water and Sanitation by Sub District, 2008

Coverage access water and sanitation	Safe Water		Percent cumulative t	Safe Sanitation		Percent cumulative t
	Sub District	Percent		Sub District	Percent	
<25%	20	17.2	17.2	14	12.1	12.1
25.01%-50.00%	23	19.8	37.1	50	43.1	55.2
50.01% - 75.00%	63	54.3	91.4	35	30.2	85.3
>75.01%	10	8.6	100	17	14.7	100
Total	116	100.0		116	100.0	

4.2. Bivariate Analysis The Socioeconomic Factor Affecting Nutrition Status

There do exist the same pattern between the percentage of poor households, percentage stunted in population and percentage health expenditure on district and city in West Nusa Tenggara Province. Figure 4.3, shown that if the percentage of poor households low, the prevalence of stunted incident also low, likewise in the percentage of health expenditure in every district and city.

Figure 4.3 : The Pattern of Prevalence Stunted, Percentage of Poor Households and Percentage of Health Expenditure by Districts, 2008



To analyze the relationship between variable independent and variable dependent in this study, we used correlation analysis.

Based on the result of correlation analysis (see Appendix A), shown that the prevalence of stunted (HAZ Score \leq -2 SD) in population has significant relationship with percentage of woman illiteracy, percentage of poor households, access under five children to Posyandu services and poverty gap in the sub district and also ethnicity in region.

There is no correlation between prevalence of stunted in population with variable proportion health expenditure by total budget local government that allocated in sub district, public health services includes of coverage measles immunization, households with safe water and sanitation, antenatal care services in pregnant woman, and ratio health worker and population. In the bivariate analysis also shown indicate significances relationship among variable, except proportion health expenditure and antenatal care services in pregnant woman.

4.3. Nutrition Status and Decomposition Analysis

4.3.1. Prevalence of Nutrition Status in Population

The following table is a data the nutrition status of children under five years old in West Nusa Tenggara Province in the last 3 years.

Table 4.8 : Prevalence of Stunted (HAZ score <-2 SD) in West Nusa Tenggara Province by Districts, 2008

DISTRICT/CITY	Number of sub district	Percentage of stunted		
		2006	2007	2008
MATARAM CITY	6	25.71	33.67	26.21
WEST LOMBOK	10	35.2	35.34	31.52
NORTH LOMBOK	5	-	-	31.76
CENTRAL LOMBOK	12	38.45	34.25	38.57
EAST LOMBOK	20	29.39	33.14	37.06
WEST SUMBAWA	8	29.38	32.07	36.51
SUMBAWA	24	32.74	35.88	36.02
DOMPU	8	35.81	32.24	34.9
BIMA	18	27.88	35.77	31.81
BIMA CITY	5	24.13	32.95	27.90
NTB (PROVINCE)	116	31.76	34.35	34.28

Source: PHO-NTB

Based on Table 4.8, data stunted of children under five years old in West Nusa Tenggara Province in the last 3 years is still high. In year 2008, the highest prevalence of stunted is in Central Lombok District (38.57%) and the lowest is in Mataram City (26.21). East Lombok District in the last 3 years tends to increase, in 2006 the prevalence of stunted only 29.39% and in 2008 become 37.06%. Highest prevalence stunted in Sumbawa Island, is in West Sumbawa (37.06%), and that district tends to increase in the last 3 years. The displacement occurs in the highest prevalence of stunted in district in the last 3 years. North Lombok District bis a new district in 2008, before it was a part of West Lombok District.

In 2008, sub district with the lowest stunted population is in Belo (Bima) 11.67% and the highest is in Batu Lanteh-Sumbawa (66.13%). The mean stunted in population is 34.278% and standard deviation is 10.86%.

4.3.2. Decomposition Analysis of Malnutrition Inequality

Inequality index measurement was originally used mostly to measure income levels both individual and in the household, which, should satisfy at least 3 axioms i.e. scale independence, transfer analysis or scale decomposable. Shorrocks index is one among many indexes that satisfy for these axioms. This index is applied in this thesis and is focused on community level rather than a household or an individual level. The formula of Shorrocks-Index 2nd order can be written as follows:

$$I_2 = \left(\frac{1}{2} N\right) \cdot \left[\left(\frac{Y_i}{\lambda}\right) - 1\right]^2$$

$$I_2 = \sum V_g \lambda^2 I_{2g} + \frac{1}{2} \sum V_g (\lambda_g - 1)^2$$

Result of the analysis using Shorrocks-Index 2nd order equation show inequalities in nutrition status among children in the same groups and inequality in nutrition status among children in different subgroups in Province, Sumbawa and Lombok Island. The value of Shorrocks index in all variables remain high, it means that inequality in socio economic variables in household and population in province, and among two island are also high. Except for variable ratio access under five children with Posyandu and poverty gap, because value index closes to 0 (zero). In this analysis, the number of sub district in Lombok Island as many as 53 sub districts and 63 sub district in Sumbawa Island. Thus, the population share amounted to Lombok is 45.69% and Sumbawa 54.31%. The detail results of Shorrock index calculations for each variable are in Table 4.9.

Table 4.9 : The Calculation of Shorrocks Index Inequality

Variable socio economic	Shorrocks index		
	Province	Lombok	Sumbawa
Stunted in population	0.182	0.106	0.245
Health expenditure in sub district	0.113	0.075	0.144
Poor households in sub district	0.244	0.265	0.226
Poverty gap in sub district	0.0111	0.0107	0.0114
Household with safe water	0.205	0.147	0.254
Household with sanitation	0.216	0.146	0.274
Woman illiteracy	0.183	0.135	0.224
Antenatal care services	0.159	0.058	0.244
Measles immunization services	0.140	0.068	0.200
Access with health worker (general doctor and midwives)	0.106	0.092	0.119
Acces with Posyandu services	0.060	0.067	0.053

From the table above can be seen that the index of poor household in a region almost the same, this means that the majority of poor people in every region rely on the same jobs or in the same economic sector.

Based on Shorrock index calculations, using the mathematic equation above it can be calculated the degree of inequality in each variable, the results can be seen in the following Table 4.10.

Table 4.10 : Subgroup Decomposition of Inequality Lombok and Sumbawa Island (within and between)

Nutrition status	Inequality (%)		
	Within		Between Lombok-Sumbawa (%)
	Lombok	Sumbawa	
Stunted	11.18 (41.81)	4.22 (15.79)	11.34 (42.41)

In table 4.10, it indicates has occurred inequalities in the distribution of malnutrition under five children, either in the area between the island and the island of Lombok and Sumbawa. The level of inequality in Lombok is 11.18%, it means that, Lombok island malnutrition's problem is more massive and fairly distributed among

each sub-district. While in Sumbawa only 4.22%, its mean although malnutrition remained a problem, but the variation in each sub district is more equitable and more widely spread. The data also shows, Lombok is the main contributor to high incidence of malnutrition in West Nusa Tenggara Province, approximately stunted incidence can be explained by 41.81% occurred in Lombok. This can be understood because the incidence of poor households has the greatest contribution (59.73%) (see appendix C). The high illiteracy rate among women may also explain why in Lombok Island malnutrition cases is very high, since various studies have shown that low levels of woman education is positively correlated with malnutrition.

For the Sumbawa Island, it can be explained that the incidence of malnutrition in the community caused by various factors inequities in basic infrastructures, few households have access to clean water facilities, or households that use latrines. The low access to health worker especially general practitioners and midwives, and the distribution of health workers in the Sumbawa Island could also explain the problem of malnutrition in a community.

4.4. Multivariate Analysis

To understand relationship between incidence nutrition statuses (stunted) with other factors, Ordinary Least Square (OLS) with enter method was used to estimate values of coefficients and other indicators. In this method is using multicollinearity checked. Table 4.11 is summaries the results of the multivariate analysis between dependent variable incidence stunted in population and socioeconomic variables in sub districts. The detail analysis, see in Table 4.11.

In the regression analysis, value of R square was 0.882 that means 88.20% of independent variable can explain the dependent variable. Value of F test was 61.424 with $p < 0.05$, this means that coefficients of the significant variable in regression model were not equal to zero. The variables of Sasak ethnic, is dropped from the analysis, because there is multicollinearity.

Table 4.11 : Linear Regression for Factor Affecting Stunted Incident in Population

Model predictor constant	Coefficients	Standard Error	t	Sig
Constant **)	44.492	6.497	6.848	.000
Health expenditure in sub district	-3.134	4.578	-.685	.495
Percentage poor households in sub district **)	.067	.032	2.094	.039
Poverty gap in sub district**)	1.325	.649	2.042	.044
Household with safe water **)	-.047	.019	-2.458	.016
Household with sanitation **)	-.052	.020	-2.615	.010
Woman illiteracy **)	.217	.081	2.678	.009
Antenatal care services **)	-.064	.029	-2.223	0.28
Measles immunization services	-.029	0.34	-.845	.400
Ratio health worker and population	.469	1.042	.450	.654
Ratio access Posyandu services	.008	0.14	.547	.586
Dummy Samawa ethnic**)	10.496	1.231	8.523	.000
Dummy Mbojo ethnic**)	-19.929	1.374	-14.509	.000

Dependent Variable : stunted Scatter Plot diagram se Appendix B

R Square : 0.882 Adjusted R Square : 0.869

F Value : 64.424, P : 0.000

**) p value less than 0.05

Based on bivariate and multivariate analysis above, it can be concluded that the variable percentage of poor households in a community, poverty gap of a region, antenatal care services in pregnant woman, woman illiteracy rate, household with safe water, household with latrine are the main variables that have significant effect on the incidence of malnutrition (stunted) in a region. Besides that, ethnic factor is also another important factor affecting the malnutrition. This means that the factor of location (region) and the cultural of society also become the most important components that affect the high prevalence of malnutrition in the West Nusa Tenggara Province.

In the regression analysis also shows that the coefficient of the ratio of health workers to population variable and ratio under five children with Posyandu showed a positive values, this means that the less health worker and Posyandu services in a region will lead to the increasing prevalence of malnutrition in that region.

In this study also found, given measles immunization in infants has no effect to reduce the prevalence of malnutrition in the community. It is possible, because due the factor to measles vaccine efficacy. As it is known that vaccines storage need a certain temperature requirement, whilst, the network of rural electricity infrastructure is not adequate, as well as extensive coverage of immunization is in an area, it is possible to decrease vaccine efficacy condition. It can be proved by the existence of measles outbreak in the region.

In addition, the analysis also shows that the coefficients of the health budget allocation and the achievement of measles immunization in a region has negative sign. This means that if local government increase health expenditure in the region it can contribute in reducing the prevalence of malnutrition, although it does not show a significant influence. This also means that the health budget is insufficient for suppressing the high prevalence of malnutrition in a region, but only satisfies to find and provide health services and improving nutrition status on children who already suffered from malnutrition. Besides, the role of the health budget is only sufficient to support the health service through the ANC program, providing immunization in infants, provision of adequate salaries and allowances for health workers in remote areas. We expect that public access to health services will become better.

The multivariate analysis showed the fact that every ethnic have different effects on nutrition status. This means that local values that live and thrive in a society greatly affect the habit of nurturing and caring for children, including education, eating patterns and processing local foods commonly consumed in daily. Those factor as a whole has a fundamental influence on behaviors that support the improvement of nutrition status in a region.

In the decomposition analysis, as measured using the Shorrocks index, both are in Lombok and Sumbawa Island showed imbalance in various variables. As already mentioned, it can be influence higher prevalence of malnutrition in a region (see appendix C). However, the results of analysis of these indices also could explain that health services that are implemented through the Posyandu showed positive

indication and fairly distributed in every area of their existence. This also means that Posyandu has a great share to ensure the attainment of target services for both programs antenatal care, nutrition, immunization, family planning and other basic health services programs.

For some variables which are not significant, such as variable of health expenditure, measles immunization, ratio of health worker and population, ratio of Posyandu and under five children, showed that Shorrocks index for these variable is close to zero. It means, that on average, these variables are more equal, although it does not guarantee community needs sufficiently.

5. Discussion

This paper has explained the relationship between socioeconomic factors and incidences stunted in West Nusa Tenggara Province using cross sectional data. Main findings are summarised as follows:

First, the result has identified that public health expenditure, expressed by proportion of health budget allocated in sub district, is insignificant to reduce prevalence nutrition status in population directly. Health expenditure only effective to support health institution and health worker to fulfill health services in population, play a role in handling and providing care to infants who have suffered from malnutrition, or play a role in the preventive effort through health promotion (immediately causes). This result is consistent with the observations by Filmer, et al. 1998 and Gupta, et al. 1999.

Second, the bivariate and multivariate analysis shows that all variables have relationship to reduce prevalence stunted in population except health expenditure and antenatal care. It means, that to increase nutrition status needs collaboration program with the other sectors, not only in health sector. Such as education program especially woman empowerment, agriculture, village infrastructure, water and sanitation. This result also consistent with analysis by Smith and Haddad, 2000.

Third, the multivariate analysis has identified the main socioeconomic factors which affecting nutrition status in West Nusa Tenggara Province such as: percentage of poor household in community, poverty gap in sub district, woman illiteracy, access safe water in household, access in sanitation and antenatal care service. Besides, ethnic groups especially Samawa and Mbojo are significant contributor with prevalence of malnutrition. This result is consistent with the observations by Bhuta, et all 2008; Haddad, 2002; Larea, et all 2005 and Kamiya, 2009.

Finally, this paper also has identified inequality in many aspect of social economic in West Nusa Tenggara Province, whether within or between Sumbawa and Lombok Island. Besides, inequality in many aspects of socioeconomic such as poverty gap, poverty incidence, household with access safe water and sanitation, woman illiteracy and health services that impact on nutrition status. Factor of location, cultural and geographic also has contribution for existing stunted incidence in population. This result also consistent with the observations by Larea, et all 2005 and Kalipeni, 1993.



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CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Reducing malnutrition in children under five years old in West Nusa Tenggara Province is an important factor in reducing under five mortality rates. The improvement in nutrition status of children will bring benefits, improve physical conditions and increase productivity. The empirical results have confirmed that health spending in sub district (health expenditure) has not significant impact on malnutrition incidence in population. It means that health expenditure did not directly contribute to reduce inequality but to support fulfilling health services in population.

The empirical results also have confirmed that socioeconomic factors such as poverty gap in region, percentage of poor households, woman illiteracy, antenatal care services, safe water and sanitation in sub districts have significant impact on child nutrition status. Incidence of nutrition status in population exists if input factors of socioeconomic in a certain region are unequal.

5.2 Recommendations

There are many reasons to reduce malnutrition in current situation. First, incidence of malnutrition is preventable and success in addressing prevalence of malnutrition as an essential effort to reach the Millennium Development Goals (MDGs) targets in Years 2015. Second, besides immediate causes of malnutrition, there is also a need to encourage progress on underlying socio-economic determinants and the basic causes. The empirical results suggest that socioeconomic factors and basic causes are important associated with child nutrition.

Following the empirical results, policy recommendations are suggested as follows: first, focus on decreasing poverty gap and decreasing the number of poor

households among regions in disadvantages location; second, institutionalization antenatal care service for pregnant woman which integrated in nutrition education; third, institutionalization nutrition program into regional strategic socioeconomic development. This also means, to address the underlying factors cannot be handed over by local governments, but need supports from all levels (local, province and central) government; fourth, social policies and nutrition interventions should be designed by community with considering local value existed in local community. From this point of view, the following are detail recommendations:

Recommendation 1: Focus on decreasing poverty gap and decreasing the number of poor households among regions in disadvantages location.

Because of high poverty intensity, i.e. poverty gap in sub districts, many poor households have less access to safe water and sanitation, as well as high woman illiteracy. That condition will lead to rising malnutrition incidence in that sub districts. This thesis suggests local government, province and central government to develop collaboration program which is *pro poor, pro job and pro growth* with budget grant for villages and sub districts. It can be used for local economic empowerment, local infrastructure development, and community and woman empowerment. For example, supplying safe water infrastructure programme by government that followed the community lead total sanitation (community based) by poor household program in that location (sub district) would be more accelerated in reducing the incident of malnutrition in population.

Decomposition analysis shows that Lombok Island is the main contributor to high incidence of malnutrition in West Nusa Tenggara Province (41.81%). To reduce malnutrition incidence in Lombok Island, local government in Lombok Island is suggested to focus on eliminating inequality factor with program: supplying safe water and improving household with latrine toilets, also woman education improvement.

While in the Sumbawa island, besides focus on supplying basic infrastructure (safe water and latrine toilets) it should also improve health expenditure, health worker distribution and antenatal care services for pregnant woman. To prevent incidence of malnutrition in short term, policymakers should increase access on antenatal care service followed by redistribution health workers (doctor and midwives) in disadvantages location with sufficient incentive.

Recommendation 2: Institutionalization antenatal care service for pregnant woman and integrated with nutrition education.

Findings show clearly, that antenatal care services program is significant to reduce malnutrition incidence. Considering the highest prevalence of woman illiteracy rate in West Nusa Province, it is necessary to develop an integrated antenatal care services and nutrition education. The examples of program are: establishing health reproduction working group for adolescent in sub villages, establishing pregnant woman working group in every sub villages and discussed in many aspect such as: pregnancy, breastfeeding, caring of children, nutrition education for babies and children and facilitated by health worker. In this case, local government should support in developing and supplying thematic modules accordance with the problem. The topic in each module can be varied, depend on the local problem and situation but focus on health promotion and health education. With this kind of integrated activities, the government can solve three problems simultaneously in the same time. Firstly, increasing coverage health service for pregnant; secondly, improving nutrition education for pregnant woman which hopefully will have a better knowledge about child nutrition and parenting; thirdly, reducing woman illiteracy in the region.

Recommendation 3: Institutionalization nutrition program into regional strategic socioeconomic development

Considering the result of study and the broad impact of social economic on malnutrition, therefore reducing malnutrition program cannot separate in health sector, but must be integrated with multi sector approach. The keyword of success on

reducing malnutrition in the region are; integrated in every level of government, multi sector approach and good institutional with supported by adequate food and nutrition surveillance information system.

Recommendation 4: Community based nutrition interventions

Bivariate and multivariate analysis shows that the ethnic factor is also the important factor that affect on highest malnutrition. Therefore, to address malnutrition problems, the local government should consider the local values that exist and live in the community. Thereby empowering the community becomes an important factor to overcome this problem. Therefore it is required an effort to encourage and increase participation of community leaders and traditional leaders in nutrition education and counseling. The form of program activities can be, institutional strengthening nutrition working group in sub village, developing cultural exhibition as a media promotion, and developing nutrition education using local media.

5.3 Limitation of the Study

This research attempted to study about determinants of inequality in socioeconomic factor based on economic theory and affecting incidence nutrition status in children under five years old in the population in West Nusa Tenggara Province, Indonesia. Some limitations in this study are:

First, This study focused on examining the underlying factors that influence the nutrition status of children in a society, therefore the data collected and its policy direction is more on macro scale. Further analysis is required for an individual scale which exists in every ethnic.

Second, in this study, we only examine some of the factors that influence the nutrition status of children, other factors such as food prices, geographic factors, health status of children, the diseases they had suffered are not used as a research variables. Due, the province with many islands, food prices is an important factor, since the food distribution and food availability on the island also depend on season.

Besides, the nutrition status of children is also strongly influenced by the history of their health status.

5.4 Suggestions for Further Study

1. In this study, it is found that the ethnic factor has an important role. Therefore, it is advised to conduct a qualitative study to identify community values and habits that influence directly or indirectly to nutrition status in a region, especially in Indonesia, which has a variety of ethnic and islands.
2. Given Indonesia is an archipelago state, it is necessary to conduct a research relating to the geography, climatic factors and season. Because these are important factors, at certain times, natural conditions greatly affect food availability in a region.



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REFERENCES

- Alderman, H., Hoogeveen, H., Rossi, M. Reducing child malnutrition in Tanzania combined effects of income growth and program interventions. **Policy Research Working Paper 3567**. World Bank, 2005.
- Alderman, H., Hodinott, J., Kinsey, J. Long term consequences of early childhood malnutrition. **Oxford Economic Papers** 58 (2006): 450-474.
- Bappenas – UNDP. **Report on the achievement millennium development goals Indonesia 2007**. National Development Planning Agency (Bappenas)-Jakarta, (2007).
- Beaton, G., et al. Appropriate uses of anthropometric indices in children – **Nutrition Policy Discussion Paper 7**. United Nations and Nations Unies, 1990.
- Bence, J.B., et al. Reducing child malnutrition in Tanzania nutrition and health status of children in internally displaced households in the Kosti Region of Sudan **Food Policy and Applied Nutrition Program Discussion Paper 26**. School of Nutrition Science and Policy, Tufts University Boston, Massachusetts USA. 2004.
- Billig, P., Bendahmane, D., Swindale, A. Water and sanitation indicators measurement. **Guide in Food and Nutrition Technical Assistance**. USAID, 1999.
- Bitran, R., Ma, C., Ubilla, G. Geography, health status, and health investment, a analysis of Peru. **Research Network Working Paper - 402**. Inter America Development Bank Latin American Research Network. 2000.
- Bhutta, Z.A. et al. What works? Interventions for maternal and child under nutrition and survival. **Maternal and child under nutrition** 371 (2008): 417-440. [Online] available from: www.thelancet.com.
- Black, R.E., et al. *Global and regional exposures and health consequences*. **Maternal and child under nutrition** (2008): 243-260. [Online] available from: www.thelancet.com.
- Blössner, M., Onis, de M. Malnutrition: quantifying the health impact at national and local levels. **Environmental Burden of Disease Series 12**. Geneva: World Health Organization (WHO), 2005.
- BPS-UNDP, Survey Sosial Ekonomi Nasional (Susenas) Indonesia 2001. BPS. Jakarta, 2001.

- BPS-UNDP. Survey Sosial Ekonomi Nasional (Susenasi) Indonesia 2003. BPS. Jakarta, 2003.
- BPS-UNDP. Survey Sosial Ekonomi Nasional (Susenasi) Indonesia 2004. BPS. Jakarta, 2004.
- BPS. Survey Sosial Ekonomi Nasional (Susenasi) Indonesia 2005. BPS. Jakarta, 2005
- BPS-NTB. Provinsi Nusa Tenggara Barat Dalam Angka 2008. BPS. Mataram, 2009.
- BPS Mataram. Kota Mataram Dalam Angka 2008, BPS. Mataram, 2009.
- BPS Lombok Barat. Kabupaten Lombok Barat Dalam Angka 2008. BPS. Gerung, 2009.
- BPS Lombok Tengah. Kabupaten Lombok Tengah Dalam Angka 2008. BPS. Praya, 2009.
- BPS Lombok Timur. Kabupaten Lombok Timur Dalam Angka 2008. BPS. Selong, 2009.
- BPS Sumbawa Barat. Kabupaten Sumbawa Barat Dalam Angka 2008. BPS. Taliwang, 2009.
- BPS Sumbawa. Kabupaten Sumbawa Dalam Angka 2008. BPS. Alas, 2009.
- BPS Dompu. Kabupaten Dompu Dalam Angka 2008. BPS. Dompu, 2009.
- BPS Kota Bima. Kota Bima Dalam Angka 2008. BPS. Bima, 2009.
- BPS Bima. Kabupaten Bima Dalam Angka 2008. BPS. Raba, 2009.
- Cogill, B. Anthropometry indicators measurement guide in food and nutrition. **Technical Assistance Project**. Academy for Educational Development, Washington. D.C, 2001.
- Cleaver, K., Okidegbe, N., Nys, dE. Global issues facing humanity agriculture and rural development. **Seminar Series: Hunger and malnutrition. Department Agriculture and Rural Development**. World Bank. 2005. [Online] available from <http://siteresources.worldbank.org>.
- Cowell, F. Measurement of inequality. **Discussion Paper** 36. London School of Economics and Political Science. The Toyota Centre Suntory and Toyota International Centre for Economics and Related Disciplines London School of Economics and Political Science. London, 1998.

- Davidson, F. **Nutrition and health in nutrition: a foundation for development**. ACC/SCN. Geneva, 2002. [Online] available from: www.scnnews.org. [2009. Dec 1].
- Deolalikar, A. Poverty and child malnutrition in Bangladesh. **Policy Research Working Paper** 30866. World Bank, 2004.
- Dikpora NTB. *Statistik Pendidikan Provinsi Nusa Tenggara Barat* (English: Educations Statistic in West Nusa Tenggara Province). Dinas Dikpora Prov. NTB. Mataram, 2009.
- Doorslaer, v. E., et al. Income-related inequalities in health: some international comparisons. **Journal of Health Economics** 16 (1997): 93-112. [Online] available from: www.elsevier.com. [2010. January 3].
- Drummond, F.M., et al. **Methods for the economic evaluation of health care programmes** (Second Edition). Oxford University Press. New York, 1998.
- Eide, B.W. **Nutrition and human rights in nutrition: a Foundation for Development**. ACC/SCN. Geneva. 2002. [Online] available from: www.scnnews.org. [2009. Dec 1].
- Engle, P.L., Menon, P., Haddad, L. Care and nutrition: concepts and measurement. **FCND Discussion Paper** 18. International Policy Research Institute. Washington, D.C, 1996.
- FAO. Incorporating nutrition considerations into development policies and programmes. **Policy Brief**. Rome, 2004. [Online] available from: www.fao.org
- Filmer, D., Pritchett, L. Child mortality and public spending on health: how much does money matter?. **Policy Research Working Paper** 1864 . World Bank, 1997.
- Filmer, D., Hammer, J. and Pritchett, L. Health policy in poor countries: weak link in the chain. **Policy Research Working Paper** 1874 . World Bank, 1998.
- Frongillo EA, Onis dM, Hanson KMP. Socioeconomic and demographic factors are associated with worldwide patterns of stunting and wasting of children. **Journal of Nutrition** 127 (1997): 2302-2309. [Online] available from: www.jnnutrition.org. [2009. Dec 23].
- Gabriele, A., Schettino, F. (2007). Child malnutrition and mortality in developing countries: evidence from a cross-country analysis. **MPRA Paper** 3132. Polytechnic University of Marche, University of Rome "la Sapienza" and UNCTAD-UN, 2007.

- Girma, W., Genebo, T. **Determinants of nutritional status of women and children in Ethiopia**. Ethiopia Health and Nutrition Research Institute, Addis Ababa, Ethiopia. ORC Macro. Calverton, Maryland USA, 2002.
- Gomez, F., et al.. Mortality in second and third degree malnutrition. **The Journal of Tropical Pediatric** 2 (1956). in Bulletin of The World Health Organization 2000: 78 .
- Gragnoli, M. et al. **India's malnourished children: a call for reform and action**. HNP The World Bank, Washington, D.C, 2005.
- Gupta, S., Marjin, V. and Tiongson, E. Does higher government spending buy better results in education and health care?. **IMF Working Paper** 21. International Monetary Fund (IMF), 1999.
- Gupta, A. and Rohde, E.J. Infant and young child under nutrition where lie the solutions? **Economic and Political Weekly** 4 (2004): 5213-5216. [Online] available from: www.ibfanasia.org/Article/IYC-Undernutrition.pdf. [2009. Dec 23].
- Haddad, L. Nutrition and poverty in nutrition: a foundation for development. ACC/SCN. Geneva, 2002. [Online] available from: www.scnnews.org. [2009. Dec 1].
- Huber, H. Decomposing the causes of inequalities in health care use: a micro-simulations approach. **Journal of Health Economics** 27 (2008): 1605–1613. [Online] available from: www.elsevier.com. [2010. January 3].
- Islam, R. Poverty and its effect on nutrition: some questions based on the Asian experience, nutrition and poverty – **Symposium Report 24th : Nutrition Policy Discussion Paper** 16 (1997): 51-57. [Online] available from: www.scnnews.org. [2009. Dec 1].
- Jekel, F.J., Joan, G.E., David, L.K. **Epidemiology biostatistics and preventive medicine**. W.B. Saunders Company. Tokyo, 1996.
- Kalipeni, E. Determinants of mortality in Malawi: a spatial analysis. **Social Science Medicine** 37 (1993): 183-198. Department of Geography Colgate University. New York.
- Kamiya, Yusuke, Economic analysis on the socioeconomic determinant of child malnutrition in Lao PDR. **Discussion Paper** DP-2009-E-007. OSIPP. Osaka. Japan, 2009.
- Larrea, C., Montalvo, P., Ricaurte, M.A. Child malnutrition, social development and health services in the Andean Region. **Research Network Working Paper** R-495. FLACSO, Ecuador. Inter-American Development Bank Banco

Interamericano de Desarrollo Latin American Research Network Red de Centros de Investigación, 2005.

Makinen, M., et al. Inequality in health care use and expenditures: empirical data from eight developing countries in transition. **Bulletin World Health Organization** 78 (2000): 55-65. WHO. New York.

Mason, B.J. and Gillespie, S.R. Policy to improve nutrition: what's was done 1980's. **SCN News** 06 (1990): 15. United Nation. New York.

Ministry of Health RI. **Riset Kesehatan Dasar (Riskesdas) 2008** –(English: Base Health Research-2008). Jakarta, 2008.

Ministry of Health RI. **Indonesia Health Profile 2007**. Jakarta, 2008.

Ministry of Health RI. **RPJP Bidang Kesehatan 2005-2025** (Long Term Planning in Health Sector). Jakarta, 2005.

Mosley, W.H., Chen, L.C. An analytical framework for the study of child survival in developing countries. **Population and Development Review** 10 (1984): 25-45. [Online] available from: www.jstore.org/stable/2807954. [2010. January 09].

Murray, C.J.L., Gakidou, E.E., Frenk, J. Critical reflection health inequalities and social group differences: what should we measure? **Bulletin of the World Health Organization** 77 (1999): 537-543.

O'Donnell, O., Doorslaer, V.E., Wagstaff, A., Lindelow, M. **Analyzing health equity using household survey data a guide to techniques and their implementation**. World Bank Institute. Washington. D.C, 2008.

Onis, de M. Measuring nutritional status in relation to mortality. **Bulletin of the World Health Organization** 78 (2000): 1271-1274.

Pelletier, D.L., Frongillo, E.A. Changes in child survival are strongly associated with changes in malnutrition in developing countries. **Food and Nutrition Technical Assistance** (2003): 107-119. [Online] available from: www.Jnnutrition.org [2010. January 10].

Pelletier, D.L. **The relationship between child anthropometry and mortality in developing countries: implications for policy, programs and future research**. Cornell University, New York, 1994. [Online] available from: www.Jnnutrition.org [2010. January 10].

Pelletier, D.L. **Nutrition and Politics in Nutrition: Foundation for Development**. ACC/SCN. Geneva. 2002. [Online] available from: www.scnnews.org. [2009. Dec 1].

- Pelletier, D.L., Frongillo, E.A., Schroeder, D.G., Habicht, J.P. Epidemiologic evidence potentiating effects of malnutrition on child mortality. **American Journal Public Health** 83 8 (1993):1130-1133.
- Peng, F., Donga, S., Xiao, J., Liud, C., Feng, X., Wang, Y. Regional inequality in health and its determinants: evidence from China. **Journal Health Policy** 94 (2010): 14–25. [Online] available from: www.elsevier.com. [2009. Dec 5].
- Preston, H.S. The changing relation between mortality and level of economic development. **International Journal of Epidemiology**, June (2007). Oxford University Press on behalf of the International Epidemiological Association.
- Provincial Health Office (PHO). **Laporan Monitoring Status Gizi 2008** (in English: *Reporting of Monitoring Nutrition Status, 2008*). Dikes Prop. NTB. Mataram, 2009.
- Quisumbing, A.R., Maluccio, J.A. Resources at marriage and intra household allocation: evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. **Bulletin of Economics & Statistics** 65 3 (2003): 283-327. Oxford University.
- Rosegrant, M. and Meijer, S. **Appropriate food policies and investments could reduce malnutrition by 43% in 2020**. Environment and Production Technology Division, International Food Policy Institute, 2009. [Online] available from: www.jnnutrition.org. [2009. Nov 30].
- Rajkumar, S.A. and Vinaya, S. Public spending and outcomes: does governance matter? **Journal of Development Economics** 86 (2008): 6–111. World Bank, Washington. [Online] available from: www.elsevier.com. [2009. Dec 30].
- Saadah, F., Waters, H., Heywood, P. Watching brief Indonesia: undernutrition in young children East Asia and the Pacific Region. **Policy Research Working Paper** 24786. World Bank. Washington, 1999.
- Santisart, I. Growth, structural change, and inequality the experience of Thailand in inequality, growth and poverty in an era of liberalization and globalization by Geovani A Cornia (Editor) **World Institute for Development Economics Research of The United Nation University**. (2004): 405-427. Oxford University Press. US.
- Savedoff, W. **How much should countries spend on health?** WHO. Geneva, 2003.
- Schultz, T.P. Studying the impact of household economic and community variables on child mortality. **Population and Development Review** 10 (1984): 215-235. [Online] available from: www.jstor.org/stable/2807962 [2010. Jan 11].

- Shorrocks, F.A. The class of additively decomposable inequality measures **Econometrica** 48 3 (1980): 613-625. The Econometric Society, [Online] available from: www.jstor.org/stable/1913126 [2010. Jan 03].
- Shrimpton, R. (2002). **Nutrition and Community in Nutrition: Foundation for Development**. ACC/SCN. Geneva. 2002. [Online] available from: www.scnnews.org. [2009. Dec 1].
- Smith, C.L., and Haddad, L. **Explaining child malnutrition in developing countries a cross-country analysis**. International Food Policy Research Institute Washington, D.C, 2000.
- Smith, C.L., et al. The Importance of women's status for child nutrition in developing countries. **Research Report** 131 (2003). International Food Policy Research Institute. Department of International, Emory University. Washington, D.C.
- Thomas, D., and Frankenberg, E. Health, nutrition and prosperity: a microeconomic perspective. **Bulletin World Health Organization** 80 2 (2002):106-113.
- UNICEF a: Strategy for improved nutrition of children and women in developing countries. **Policy Review**. UNICEF. New York, 1990.
- UNICEF) b: **The state of world children 1998: focus on nutrition**. New York, 1998.
- UNICEF) c: **The state of the world's children 1998**. New York, 1998.
- Victoria, G.C., et al. **Maternal and child under nutrition: consequences for adult health and human capital**. *The Lancet* 26 (2008):340-357.
- Wagstaff, A. and Watanabe, N. Socioeconomic inequalities in child malnutrition in the developing world. **Policy Research Working Paper** 2434 (2000). World Bank, New York.
- WHO. **Inheriting the world: the atlas of children's health and the environment**. World Health Organization. Geneva, 2004.
- WHO. **The world health report 2005: make every mother and child count**. World Health Organization. Geneva, 2005.
- WHO. Development of indicators for monitoring progress towards health for all by the year 2000. World Health Organization. Geneva, 1981.
- WHO. Quantitative techniques for health equity analysis. **Technical Note 2 Anthropometrics**. World Health Organization. Geneva, 2005.

WHO- UNDP. **2005, 2015 keep the promise Health and the Millennium Development Goals**. World Health Organization. Geneva, 2000.

World Bank. Investing in Indonesia's health: challenges and opportunities for future Public spending. **Health Public Expenditure Review 2008**. World Bank, 2008 b.

World Bank. Overview, repositioning nutrition as central to development a strategy for large-scale action. World Bank, 2006 a.

World Bank. Malnutrition causes economic loss: half of all child deaths. **Bulletin World Bank Group** 2006. [Online] available from: www.healthsystemtrust.com.

Young, H. and Jaspars, S. Review of nutrition and mortality indicators for the Integrated food security Phase Classification (IPC). **Reference Levels and Decision-making** 2009. Standing Committee on Nutrition and The Integrated Food Security Phase Classification. United Nation System.

Zere, E. and McIntyre, D. Inequities in under five child malnutrition in South Africa International. **Journal for Equity in Health** 2003. [Online] available from: www.equityhealthj.com [2010. Jan 2].



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Appendices

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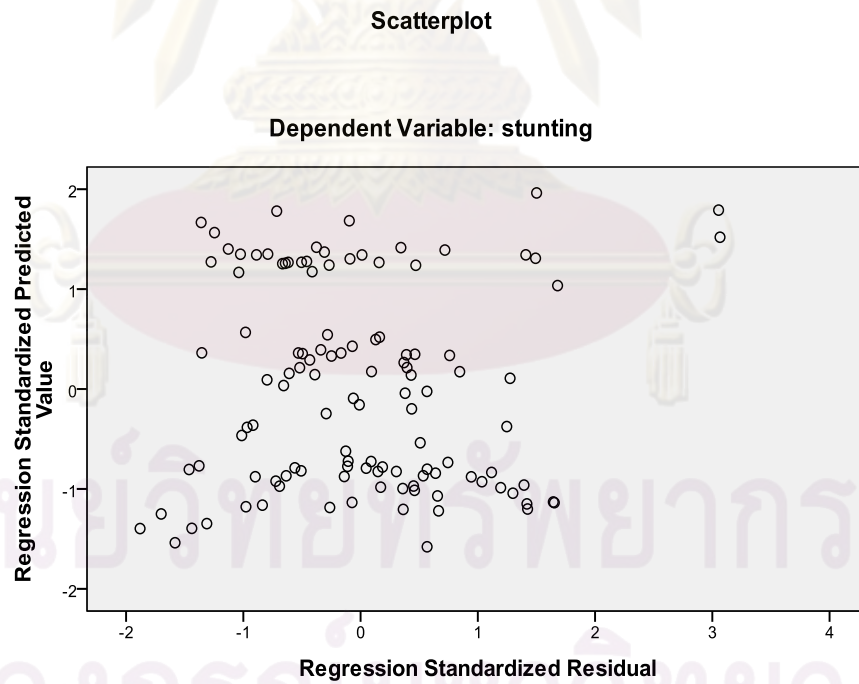
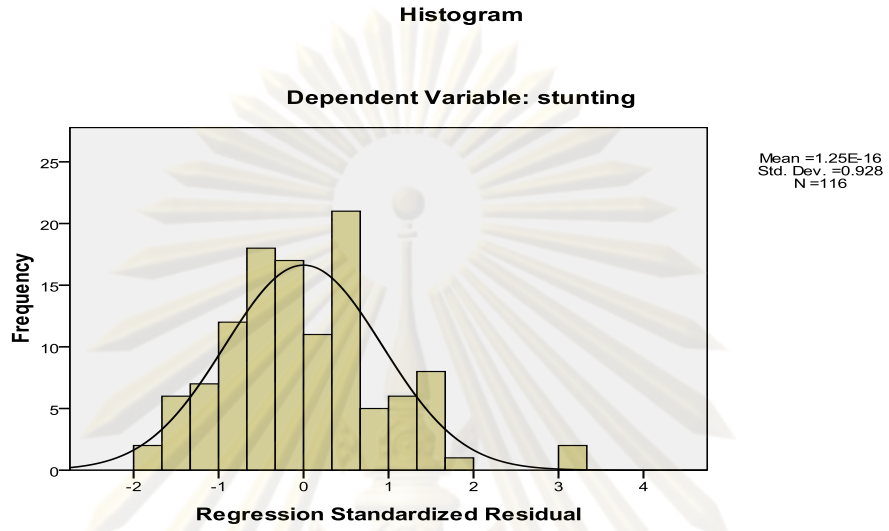
		stunting	Expenditure	hhpoverty	Poverty Gap	water	sanittaion	willtrcy	anc	measles	healthwkr	posyandu	dsasak	DSAMAWA	dmbojo	
posyandu	Correlation	.415(**)	-0.02	.321(**)	-.295(**)	.173(**)	-0.011	.324(**)	-0.105	-0.035	0.044	1	-.380(**)	0.017	-.410(**)	
	Coefficient															
	Sig. (2-tailed)	0	0.749	0	0	0.006	0.858	0	0.094	0.573	0.481	.	0	0.819	0	
	N	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116
dsasak	Correlation	-.708(**)	-0.035	-.456(**)	.598(**)	-.172(**)	-.202(**)	-.555(**)	0.028	-0.09	0.032	-.380(**)	1	-.566(**)	.554(**)	
	Coefficient															
	Sig. (2-tailed)	0	0.647	0	0	0.025	0.008	0	0.717	0.237	0.672	0	.	0	0	
	N	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116
DSAMAWA	Correlation	.167(*)	-0.026	.274(**)	-.222(*)	0.12	.189(*)	.170(*)	0.015	0.095	-0.086	0.017	-.566(**)	1	.373(**)	
	Coefficient															
	Sig. (2-tailed)	0.029	0.729	0	0.012	0.117	0.014	0.027	0.843	0.214	0.258	0.819	0	.	0	
	N	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116
dmbojo	Correlation	-.629(**)	-0.066	-.237(**)	.449(**)	-0.072	-0.036	-.454(**)	0.047	-0.006	-0.051	-.410(**)	.554(**)	.373(**)	1	
	Coefficient															
	Sig. (2-tailed)	0	0.388	0.002	0	0.346	0.638	0	0.543	0.938	0.506	0	0	0	.	
	N	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

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Appendix B :



Appendix C :

Subgroup decomposition of inequality within and between Lombok and Sumbawa Island

Variable socio economic	Inequality (%)		
	Within		Between Lombok-Sumbawa (%)
	Lombok	Sumbawa	
Stunted in sub district	11.18 (41.81)	4.22 (15.78)	11.34 (42.41)
Health expenditure in sub district	4.53 (39.56)	5.97 (52.14)	0.95 (8.30)
Poor household in sub district	28.26 (59.73)	2.76 (5.83)	16.29 (34.43)
Gap Poverty in sub district	0.22 (26.19)	0.18 (21.43)	0.44 (52.38)
Household with safe water	17.14 (55.08)	4.92 (15.81)	9.061 (29.12)
Household with sanitation	14.06 (48.06)	4.96 (16.95)	10.24 (34.99)
Woman illiteracy	12.53 (47.04)	5.27 (19.79)	8.836 (33.17)
Access basic education	5.08 (44.20)	6.4 (55.69)	0.012 (0.10)
Antenatal care services	5.89 (28.61)	4.57 (22.20)	10.13 (49.20)
Family planning services	10.82 (38.10)	3.47 (12.22)	14.108 (49.68)
Immunization services	7.33 (36.14)	4.31 (21.25)	8.645 (42.62)
Access with health worker (general doctor and midwives)	5.19 (30.92)	11.59 (69.05)	0.004 (0.02)
Posyandu services	3.93 (57.21)	2.93 (42.65)	0.01 (0.15)

Notes : Figures in the parentheses are percentage contributions to overall individual inequality

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