



**UNIVERSITAS OF INDONISIA**

**FACTORS SOCIOECONOMIC WATER AND SANITATION  
ACCESS TO HEALTH SERVICE AND IMMUNIZATION  
STATUS OF CHILDREN WITH STUNTING IN UNDER FIVE  
CHILDREN IN SIKKA AND LUMBORK DISTRICT**

**THAESIS**

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**ID NO: 1106105455**

**FACULTY OF PUBLIC HEALTH**

**INTERNATIONAL MPH PROGRAM**

**UNIVERSITY OF INDONITIA**

**JAUNORY 2012**



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**THAESIS**

**Submitted to fulfill the requirement to obtain**

**Master degree of public health**

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## STATEMENT OF ORIGINALITY PAGE

A research study by title of factors association water and sanitation access to health service and immunization of status of children under five with stunting in district Sikka and lumbork NTT province of Indonesia is my own work and effort of my further analysis by use of secondary data which was collected by center of health research university of Indonesia in 2007 .all source that I have used or quoted have been indicated and acknowledged means of complete reference.

Kamalludin behzad

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January 2012

APPROVAL PAGE

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Study Program : Master of Public Health

Thesis title: FACTORS SOCIOECONOMIC WATER AND SANITATION ACCESS TO HEALTH SERVICE AND IMMUNIZATION STATUS OF CHILDREN WITH STUNTING IN UNDER FIVE CHILDREN IN SIKKA AND LOMBOK DISTRICT

**Has been successfully defended in front of the board of examiner and was accepted as requirements necessary to obtain a master degree of Public Health in Faculty of Public Health University of Indonesia**

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By the name of almighty Allah the most compassionate and most merciful.

This is the most compassion of almighty Allah to accomplish this program with success. I would like to express my thanks from the ministry of health and specially Afghanistan health minister excellence Dr Soria Dalile to mad us the first time opportunity to get this chance and also the second from Jica institution to provide for Afghanistan doctors this scholarship opportunity to attend this international master public health program while our country is post conflict country it need to more for higher educated personal to run the public health program and policy in proper way because Afghanistan is one of developing county and new in that condition of growing need more that staff to be equipped with knowledge of era to answer the current challenge of public health priority to solve many problem that are conflicting people . So providing this kind of scholarship is necessary for doctors to promote the public health knowledge.

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And also I want express a lot of thank from my examiner DR Kusharisupini DR Bisral and lip syaiful that during three round my seminar and final exam participated and give me valuable comment and suggestion for precision and improvement of my thesis.

STATEMENT OF PUBLIC HEALTH APPROVAL FINAL  
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## ABSTRACT

**Name:** kamaluddin behzad

**Program:** international master public health.

**Title:** this study was aimed to assess factors socioeconomic water and sanitation access to health service and immunization status of the children less than five years with occurrence of stunting in Sikka and Lombok District in in temore Province .our data was secondary data has been collected By Research center UI after analyzing data with stata 2010 unvariat bivariate analysis in summary we find that from 2593 children under five 54.47 were normal and 45.53 were stunted and in multivariate analysis the male children had 1.2 time the risk stunted and had significant association with stunting according age of mother at the age 20-30 year have risk 6.1time to stunted age <20 year had 5 time more risk of stunting and significant association with stunted and in socioeconomic have significant association with stunted poor family had 1.1 time more risk to stunted by going high every level socioeconomic prevalence of stunting going down.

Use of soap in hygiene activity non us of soap had 1.5 time risk to stunted than who used soap in hygiene activity had less risk to stunted. Use of soap had significant with stunted.

And according health service utilization that family who used form self-medication had more stunted children than who use community private or government facility and health service utilization in long term illness had significant association with stunting.



## ENDORSEMENT

**Assessment of factor socioeconomic water and sanitation access to health service status of immunization children under five with stunting**

Here by, it is to approve that the thesis meet and fulfilled the requirement of graduation and passed by the examiner board faculty of public health

University of Indonesia

January 2012

Depok

Prof.Dr kusdinar

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#### List of abbreviation

DPTH: diphtheria pertussis homophiles influenza

BCG: Bacilli Calmette-Guérin

PEM: protein energy malnutrition

SD: standard deviation

UNICEF: United Nations (International) Children's Fund.

WHO: world health organization

SEA: south East Asia

SES socio economic status

DAILY: disability adjusted live year

BW: body weight

BW/H: body weight /height

H/A: height/age

BW/H: body weight /height

AC: anthropometry calculator

AA: anthropometry assessment

AS: anthropometry survey

MUAC: mid upper arm circumference

BMI: body mass index

IQ: intelligence quotient

# Chapter 1

## 1.1 introductions:

Children who do not have growth, don't have enough food for the increasing their body growth, slowly getting malnutrition. The Occurrence of serious event that occurring near children, especially near children under five years age As a result of lack of energy and protein fate carbohydrate, and micronutrient also necessary for the growth of children this element saves the children from infection and other factors. If the child note take this constrictive element for their body. They will become malnourish and it effect in the future to their growth and development of their brain and immunity system. Maybe case of death near them.( Dr multi van Blumroder year 2000)

Adequate nutrition is not only essential for proper growth and physical development but ensures optimal working of capacity. Normal reproductive performance and adequacy of immune mechanism from conception to adulthood Children less than 5 years, who constitute about 9.4%of the total global population, are the primary victims of malnutrition. The association between malnutrition (measured as poor anthropometric status) and mortality has been well established. In addition, malnutrition has been shown to increase mortality associated with diseases, especially diarrhea and acute respiratory infections. Malnutrition is responsible, directly or indirectly, for 54% of the 10.8 million deaths per year in children under five and contributes to every second death. (53%) associated with infectious diseases among children under five years of age in developing countries. Malnutrition is a particular concern in developing countries. A report by UNICEF published in 2006 states that around 146 million children in

developing countries are underweight. (Rechard Semba and Martin W Bloem, 2008)

Also in south Asia between all type malnutrition stunting magnitude is still remain very high Stunting represents linear growth failure due to poor nutrition and infections both before and after birth. Stunting in early childhood is associated with poor cognitive motor

socioemotional development, and increased mortality. Stunted children do not reach their full growth potential and become stunted adolescents and adults. The functional consequences of stunting continue in adulthood, with reduced work capacity and, in women, increased risk of mortality during childbirth and adverse birth outcomes. Worldwide, about a third of preschool children are stunted. Although the global prevalence of stunting has decreased from nearly 47% in 1980, most progress in the reduction of stunting has been made in Southeast Asia, with little change in sub-Saharan Africa. Child stunting is a result of long-term chronic consumption of a low-quality diet in combination

with morbidity, infectious diseases, and environmental problems. (Rechard Semba and Martin W Bloem, 2008)

The optimal growth and development of infants and young children are fundamental for their future Stunting, a deficit in height or length relative to a child's age is a major health problem in South Asia where half of children aged less than five years are stunted In Indonesia, 37% of children aged less than five years are stunted Promoting better eating habits in an effort to improve nutrition is one of the most challenging tasks in Indonesia as malnutrition remains one of the most important public health problems facing almost every district In Indonesia, like many developing countries, the most

common nutritional problems in infancy and early childhood are stunting, wasting; iron-deficiency anemia, poverty and low birth weight [Malnutrition during the first 2 years of life can lead to mortality and morbidity in childhood and is one of the most preventable risk factors for mortality. ( Kerry J Inder, Steven J Bowe 2009)

Past studies have also shown that lower intelligence quotient (IQ), mother's height, male sex, mother and father level of education, poverty, socioeconomic status, residence, child care behavior (inadequate complimentary feeding and breastfeeding), cultural beliefs, access to health care and environmental ecosystems are factors associated with stunting in children aged less than five years.

Despite the persistently high prevalence of stunted children in Indonesia, there is a lack of information about the prevalence and risk factors associated with stunted and severely stunted children in the province of Indonesia assesses the prevalence and risk factors associated with stunting and severe stunting in children aged 0-59 months old also in SIKKA and IOMBOK DISTRICT) Timor province. ( Kerry J Inder, Steven J Bowe 2009)

So it shows the magnitude of malnutrition among children under five in Indonesia. Specially stunting in SIKKA and LOMBOK TENGAH DISTRICT Timor province so we want by assess, the association of factors like socioeconomic, access to health service, immunization status, water and sanitation related to stunting.in the mentioned province.

### **1.2: Problem statement:**

Malnutrition remains a public health problem in Indonesia for both urban and rural population. The prevalence of children below the age of 5 increased from 25% in 2000 to 28% in 2005 It is recognized that childhood malnutrition leads to poor school enrolment and achievement in all regions

of Indonesia. Evident from the national health and household survey data .In 2001, showed that prevalence of stunting was 46% ,while the prevalence of wasting was about 15.8%,wih the only moderate rural urban differences. In the other hand, it usually reflects poverty and worsens social condition. An analysis of the nutritional status of children under 5years and household income in Indonesia indicates that child malnutrition is fundamentally the poor and vulnerable family, but it is also rare, among the population that has low education. (Jenis Berkas 2007 )

Reducing hunger and malnutrition are essential, achieve the millennium development goal. Having enough food to eat, attending schools and maintaining a healthy life are critical towards poverty reduction. Achieving universal primary education, reducing disease and mortality of the children as one of the significant .of the millennium development goal .Indonesia has made important in health education and social service, However hunger and malnutrition are prevalent among fewer than five children specially stunting in many parts of the country. Also in sikka and lombork district still suffering from malnutrition As well as stunting.

( (Jenis Berkas 2007)

So in this survey try to find the effect of multi factors regarding malnutrition (stunting), we try in this study to find ,relation of blew factors to the stunting of the children under five years in tow district of SIKKA AND LOMBOK TENGAH DISTRICT. How these study factors have negative or positive relation with the magnitudes of malnutrition. in districts by using secondary data that has been collected by baseline household survey will used for the result of association of below mentioned factors to stunting.

1: socioeconomic factor like (age of the mother, education of mother, occupation of mother, economic level of the family. House ownership) related to malnutrition.

2: Factor associated to water and sanitation of, family like (source of drinking

water , water process before drinking), and washing hand use of soap during hygiene activity before preparing food, before breast feeding, after defecation after cleaning child defecation etc.)

3: factor associated to accesses to health service. Like,(utilization health service during acute or chronic illness from community, self-medication, government facility and private facility etc.)To stunting

4: factor associated to immunization coverage like (vaccine coverage BCG, DPTH, measles etc. ) According to the age of the children with stunting

### **1.3: Research question:**

What are the Association of factors socioeconomic water and sanitation, accesses to health services, and immunization status health determinant among their under five children related to stunting?

### **1.4: General objective:**

To assess the relationship of socioeconomic, water and sanitation hygiene , access to health services and immunization status of the children health determinant against in occurrence of malnutrition among their under five years children in Sikka and Lombok tengah district in Indonesia.

### **1.5; Specific objectives:**

To explore and evaluate the relationship between socioeconomic factors like age of mother, occupation, education, ownership, family income level) with occurrence of,(stunting).

.To identify the relationship between water and sanitation condition like (source of drinking water, safe water process before drinking, use of soap by mother in hygiene activity , having lavatory and etc.) with (stunting).

To explores the relationship between accesses to health services (health service utilization during acute and chronic illness by self-medication, community facility, government facility, private facility, with (stunting).

To evaluate the relationship between immunization status of the children (coverage of all vaccine like polio measles DPT BCG hepatitis and H-influenza with malnutrition stunting

#### **1.6. Benefits of the study:**

The benefit of the study is that our study will explore the above mentioned factors, like (socioeconomic, water and sanitation, access to health services, and immunization status of the children, related to determinant factor of malnutrition of the children less than five years in sikka and lombork district

The research will show the attribute of related factor to magnetite of malnutrition to relevant district.

The survey will result also indicate the existing epidemiological situation of malnutrition under five year's children in the mentioned districts.

The study evidence is essential to mobilize the government authorities to control, for the prevention of malnutrition in the mentioned district.

#### **1.7. Scope of the study:**

The study will focus the effect of factors mentioned above to stunting that which one strong relation to malnutrition and how the factors have positive is negative relation as coefficient cause of stunting. The studies will evident Association of many factors that influence to the occurrence of (stunting).

And also show the degree effect that which one of them is more effective for magnitude of stunting.



## Chapter 2

### 2. Litterateur review

#### 2.1: Definition of malnutrition:

**2.2. Protein energy malnutrition** is a nutritional deficiency resulting from either inadequate energy (caloric) or protein intake and manifesting either marasmus or kwashiorkor. Childhood malnutrition the deficiency occur when energy and nutrient are not provided in sufficient amount for the body to grow and function normally. (Yngve Hofvander 1983)

#### 2.3. Definition of stunting:

Case was stunted children by using the height/age indicator the criterion for stunting was: z-value is less than -2 standard deviation (SD) below median height/age. (J Trop Pediatr. 2007)

Stunting can be diagnosed when a child's height falls more than two standard deviations below the mean height for age.

Going without food during childhood and have many deterioration for child because of physical intellectual and social development.

Children with repeated and prolonged nutrition deficiency are most stunting.

(WHO; 1996)

#### 2.4. Clinical Classification of malnutrition:

**Malnutrition** classified according to clinical sign and symptom and base on the severity degree and type of malnutrition.

### **2.2.1. Clinical classification according severity:**

Mild, moderate, and severe classifications for PEM have not been precisely defined, but patients who lose 10–20 percent of their body weight without trying may have moderate PEM. Some of the cause is replacement dependent (i.e. patients do not take in adequate protein during recovery from illness). This level of PEM is characterized by a weakened grip and inability to perform high-energy tasks.

Losing 20 percent of body weight or more is generally classified as severe PEM. Children with this condition cannot eat normal-sized meals. They have slow heart rates and low blood pressure and body temperatures. Other symptoms of severe secondary PEM include baggy, wrinkled skin; constipation ; dry, thin, or brittle hair; lethargy; pressure sores, and other skin lesions. (Yngve Hofvarder 1983)

### **2.6. Classification, according clinical feature:**

In protein energy malnutrition we have three classes according to, clinical sign and symptom one is marasmus second is kwashiorkor. And mixed marasmus kwashiorkor that have mixed sign and symptom of kwashiorkor and marasmus.

**2.6.1the marasmus:** child often has severely retarded growth and low weight from age usually below 60% of the standard weight .there is less or no subcutaneous fat, so the skin is loos seems to be too big for the body .nearly the infant always looks like an old men, or as monkey face the muscle are markedly wasted. They are flabby, and this can be easily be felt on the thigh and buttocks where the muscle should be thick and strong. There is no edema and there me be no change in hair color. there me associated sign of specific vitamin and mineral deficiency depending on the local dietary pattern .the child with marasmus usually look hungry .

**2.6.2 Kwashiorkor:** occur most often in children aged from one to three years, growth are retarded and although are wasted and flabby there more subcutaneous fat then in marasmus children .there is always edema (swilling) mainly on the feet and lower legs, and child appears moon faced the child me look fat because of the edema . to test edema press the thump over shin bone, if a dent remain after the thumb is removed ,edema is present .the hair often turns red browns or grey ; it because spars and is easily pulled out .curly hair grows straight .the skin me be pale and usually the child look anemic . In severe case a flaky paint rash seen, particularly around the large Joint of children

**2.6.3. Marasmus kwashiorkor:** Children with kwashiorkor are miserable and appetites they have no appetite and are difficult to feed.( YNGVE HOFVANDER 1983 )

About marasmus –kwashiorkor Children have a combination of symptom and sigh from both diseases (manual feeding in infant (Yngve Hofvarder 1983)

## **2.7. Sign and symptom Stunting:**

Malnourished babies will not grow the way a healthy, nourished baby would. Often, these babies seem normal until they are compared to other babies and growth charts. Once compared to growth charts, it becomes obvious that the child is undernourished. Usually, a child who experiences stunting will also experience symptoms associated with marasmus and stunting impairs host immunity, thereby increase the incidence, severity, and high duration of many infectious diseases. The long-term consequences of stunting include short stature, reduced capacity of work, mental

problem and increased risk of poor reproductive performance .( WHO 1996)

## **2.8: Cause of malnutrition**

Malnutrition is a complex condition that can involve multiple overlapping deficiencies of protein energy and micronutrient –so called because are nutrient needed by the body in only tiny amount .a child become malnourish because of illness with combination of inadequate food intake. Lack of safe water and sanitation or insufficient access to food poor health services, and inadequate child and maternal care Here is mentioning impotent of sufficient and needed cause of malnutrition, (WHO 2000)).

**2.8.1 .Hunger:** is one of the most common causes of malnutrition, with poverty as the main factor. Hunger is even worse when it strikes children, as it can damage their physical and mental development, not only when young but for a lifetime. (UNICE 2011)

### **2.8.2. Inadequate care of children and mother:**

A lack of care for women and children, especially in Third World countries, is another basic cause of malnutrition. This has only recently been acknowledged as causing malnutrition. When pregnant women are given inadequate nutrition, their children also suffer from malnutrition. Also, poor hygiene at home and careless handling of food leads to malnutrition, increasing the threat of illness.( UNICEF 2011) .

### **2.8.3. Unsafe water and poor sanitation:**

According to a report of "The State of the World's Children," about 1.1 billion people lack safe drinking water or suitable sanitation. These conditions lead to infectious diseases spreading, causing childhood diarrhea, which leads to

major malnutrition. Roughly 2.2 million children under the age of five die from diarrheal dehydration

Malnutrition is a major health problem, especially in developing countries. Water supply, sanitation and hygiene, given their direct impact on infectious disease, especially diarrhea, are important for preventing malnutrition. Both malnutrition and inadequate water supply and sanitation are linked to poverty. The impact of repeated or persistent diarrhea on nutrition-related poverty and the effect of malnutrition on susceptibility to infectious diarrhea are reinforcing elements of the same vicious circle. (Wash-WHO 2004)

#### **2.8.4 Consumption of unhealthy food:**

Malnutrition can occur in richer countries. Consuming more calories than needed can cause malnutrition just as not eating enough calories. Over-consumption of unhealthy foods usually goes along with deficiencies in essential vitamins and minerals. (UNICE 2011)

#### **2.5.5. Status of immunization**

death in the world accounting for over 40% of the 1, 4 million annual deaths due to vaccine preventable diseases. Inequalities in access to vaccine within countries mean that deaths and disability from preventable diseases concentrated primarily among the poorest and most marginalized and remote people. Failure to deliver vaccine to all infants remains the primary reason for high mortality and disability (WHO 2004)

For some of the most deadly childhood diseases, such as measles, polio, diphtheria, tetanus, pertussis, pneumonia due to *Hemophilus influenzae* type B and *Streptococcus pneumoniae* and diarrhea due to rotavirus, vaccines are available and can protect children from illness and malnutrition. So the

vaccine high coverage we can prevent many illnesses directly affected by under-five malnutrition causes. (WHO 2004)

#### **2.8.6. Un-accessibility to health services:**

In as many as 35 of the poorest countries, 30-50 per cent of the population may have no access to health services at all. Poor families are often unable to obtain even the most basic health care for their children. Poor or, Delayed care-seeking contributes up to 70% of all under-five child deaths. Countries with weak and fragile health systems have not been able to provide effective child survival strategies that are crucial to reduce under-five child deaths, and especially under-five deaths. More than 60% of all under-five child deaths can be avoided with proven, low-cost preventive care and treatment. Preventive care includes: continuous breast-feeding, vaccination, adequate nutrition and the major causes of under-five malnutrition. Levels and trends in child mortality. (WHO 2004)

#### **2.8.7. Socio economic factors:**

Socioeconomic factors include age of the mother, occupation, education of mother, level of income and house ownership of the family, stunting is a function of many socioeconomic factors, including poverty, poor living environment, unhealthy diets and behaviors and restricted access to education for mother education and behavior change has effect to child care and nutrition.

Discrimination against women and girls is an important basic cause of malnutrition. The very high rates of child malnutrition and low birth weight throughout much of South Asia are linked to such factors as women's poor access to education and their low levels of participation in paid employment, compared with other regions. (WHO UNICEF 2011)

## **2.88 breasts feeding factor**

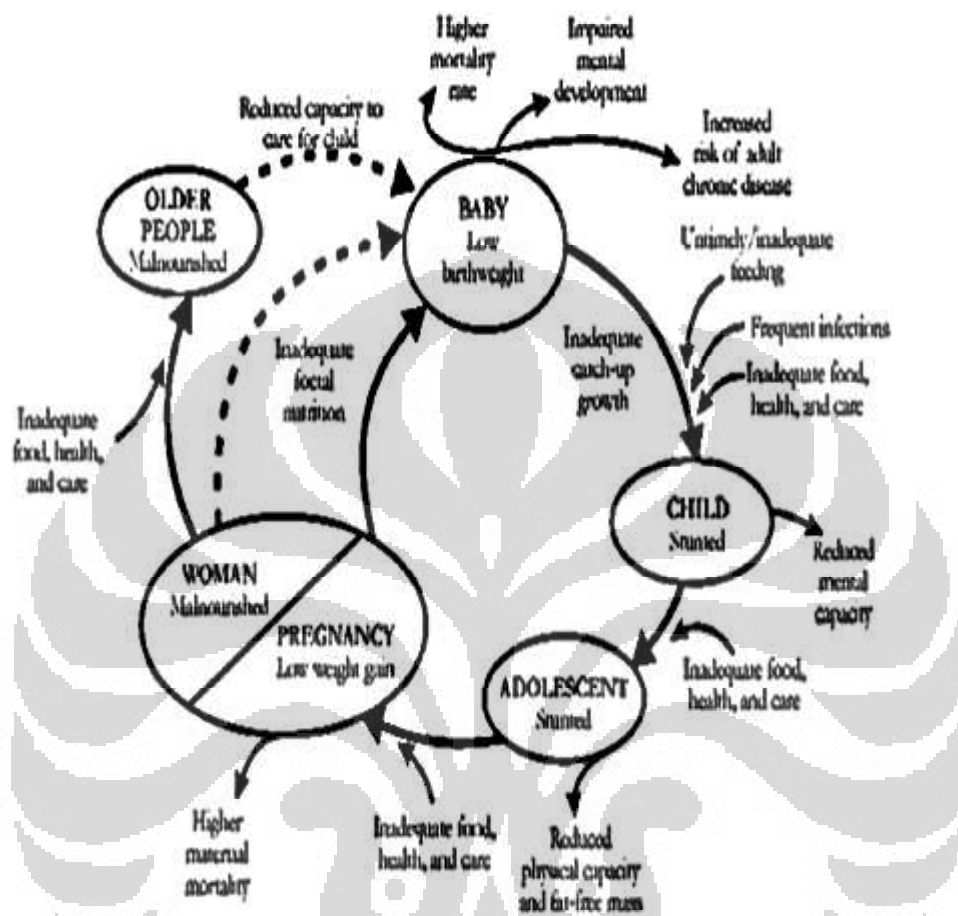
Breastfeeding is the foundation of good nutrition for infants, and inadequate breastfeeding can jeopardize infants' health and nutrition, particularly in areas where sanitation and hygiene are poor.

## **2.8.9. Chronic severely low energy and protein intake;**

deficiencies of protein energy and micronutrient –so called because are nutrient needed by the body in only tiny amount .a child become malnourish because of inadequate food intake energy protein and complementary foods of low energy and micronutrient density.. (UNICE 2011)

figure 2.1 shows the impact of malnutrition and stunting

FIGURE L1: Nutrition throughout the life cycle



Source: Prepared by Nina Sures for the ACC/SCN appointed Commission on the Nutrition Challenges of the 21<sup>st</sup> Century.

## 2.9: Prevalence of malnutrition:

Using the WHO Global Database on Child Growth, which covers 87% of the total population of under-5-year olds in developing countries, it describe the worldwide distribution of protein- energy malnutrition, based on nationally representative cross-sectional data gathered between 1980 and 1992 in 79 developing countries in Africa, Asia, Latin America, and Oceania. The findings confirm that more than a third of the world's children



are affected by kind of malnutrition. For all the indicators (wasting, stunting, and underweight) the most favorable situation — low or moderate prevalence occurs in Latin America; in Asia most countries have high or very high prevalence's; and in Africa a combination; of both This circumstances is found A total 80% of the children affected in Asia mainly in southern Asia 15% in Africa , and 5% in Latin America approximately 43% of children (230million) in developing countries are stunt (WHO 1996

#### South and South East Asia

In South Asia 46% of children under 5 are wasted, 44% of children are stunted and 15% are wasted. This is considerably higher than most other regions. ( *Progress for children: a report card on nutrition, UNICEF, 200*

Table 2.1. global estimate of the prevalence and number of underweight stunt, and wasted children in developing countries

	%underweight	%stunt	%wasted
Africa	27,4 %	28,6%	7,2%
Asia	42,0%	47,1%	10,8%
Latin America	11,9	22,2%	2,7%
Ocean	29,1%	41,9%	5,6%
All developing coun	35,8%	42,7%	9,2%

According to above table Asia have higher risk of malnutrition than Africa and America according to WHO mostly in southern Asia malnutrition by category underweight almost 42% stunted are 47% and wasted is 17% numerical data shows that most malnutrition occur in Asia and southern Asia that include Indonesia. That most population located in this area and by poverty and less possibility of live condition ethnicity and diversity cultural and behavioral differences. most vulnerable for malnutrition and mortality and morbidity children under five in this area, ( M. de Onis, C. Monteiro J. Akre and G. Clugston 1993)

.stunting It is a well-established child-health indicator of chronic malnutrition. Which reliably gives a picture of the past nutritional history and the prevailing environmental and socioeconomic circumstances Worldwide, 178 million children aged less than five years (under-five children) are stunted with the vast majority in South-central Asia and sub-Saharan Africa In Nigeria, the national prevalence of stunting among under-five children between 2000 and 2006 was 38%. Stunting is a major public-health problem in low- and middle-income countries because of its association with increased risk of mortality during childhood Apart from causing significant childhood mortality, stunting also leads to significant physical and functional deficits among survivors. according to the latest reports, stunting contributes to 14.5% of annual deaths and 12.6% of disability-adjusted life-years (DALYs) in under-five children who are stunted complete fewer years of schooling. This may be due to the fact that stunted children are known to enroll late in school .perhaps because they are not grown enough to enroll. It may also be because they drop out earlier. This may lead to fewer years of education of stunted- children when compared with tall children. Stunting hinders

cognitive growth, thereby leading to reduced economic potential. In a study on the effects of nutritional status on primary school achievement score less on achievement tests Stunting is known to be highly prevalent in environments that are characterized by a high prevalence of infectious diseases On the other hand, In developing countries, most deaths in children are among the under-five children. As a result, there is extensive literature on under-five children compared to dearth of information on the health of school children. Moreover, children who are stunted are likely to remain stunted into adulthood (Sguassero Y, de Onis M, Carroli G 2000

**Table2..2 Prevalence of Stunting (under-five years, national): 36,8% Indonesia**

East Seram	67,4%
South Nias	67,1%
South East Aceh	66,8%
Simeulue	63,9%
North Tapanuli	61,2%
West East Aceh	60,9%
South Sorong	60,6%
Middle North Timor	59,7%
Gayo Lues	59,7%
Kapuas Hulu	59,0%

*RISKESDAS, 2007*

## **2.10: nutritional status assessment method:**

**2.10.1 Brief Definition:** Percentage of underweight (weight-for-age below -

standard deviation (SD) of the WHO Child Growth Standards median) among children under five years of age; percentage of stunting (height-for-age below -2 SD of the WHO Child Growth Standards median) among children less than five years of age.

The purpose of this indicator is to measure long term underweight and stunting.

Purpose: the proportion of this indicator is to measure long term nutritional imbalance and malnutrition resulting in under nutrition (assessed by underweight and stunting).

**2.10.2 Measurement method:** the proportion of the children under five with low weight –for-age and low height –for-age can be calculated by using the following table

Table 2.3 show percentage of stunting and underweight prevalence

Category	Numerator	Denominator	Prevalence
1	Number of children under five weight /age below $-2SD \times 100$	total number of children under five measured	%underweight
2	Number of children under five height /age below $-2SD \times 100$	total number of children under five measured	%Stunting children

Nutritional status of the children under five years old measured by age, body weight (BW) and height(H) child's weight measured by digital scale that have a precision 0,1 kg body length measured by length –board with precision of 0,1cm, and height are measured with using microtoise with 0,1 cm precision. Weight and height variables of children are presented to three anthropometric index from namely: weight for age (BW/AG), height for age (H/A), and weight according to height (BW/H). .

To assess the nutritional status of the children ,then the number of weight for height of each under five years old children converted into standardized value (z-score using the anthropometry standard for under five year old children WHO 2005 .furthermore ,based on the z-score of each indicator of under five years nutritional status is determined by following restriction. .

Table.2.4.classification of nutritional status bas of indicator of weight / age:

Number	Category	Score
1	Severe	z-score <-3, 0
2	Moderate	(- 2 ≥ z-score ≥ - 3)
3	Good	(2 ≥ z-score ≥ -2)
4	Over	z-score > 2.0

Table 2.5classification of nutritional status based on indicators of height/age (H/A):

Number	Category	Score
1	Stunting	z-score<-3.0
2	Short	(-2 ≥ z-score ≥ - 3)
3	Normal	(z-score >- 2)

Table 2.6Classification of nutritional status based on indicator of weight /height (W/H):

Number	Category	Score
1	Sever vesting	z-score <-3.0
2	Wasting	-2 > z-score ≥ -3

3	Normal category	0 z-scorer $\geq -2$
---	-----------------	-------------------------

Table 2.7 classification of nutritional status based on the combine indicator of height /age and weight/height

number	Category	Score
1	Short-thin	z-score height/age $< -2.0$ and z-score weight/height $< -2.0$
2	Short -normal	z-score height/age $< -2.0$ and z-score weight /height between $-2.0$ s/d $2.0$
3	Normal height-thin	z-score height /age $\geq -2.0$ and z-score weight/height $< -2.0$
4	Normal height-normal	: z-score height /age $\geq -2.0$ z-score weight /height is $-2.0$ s/d $2.0$

### 2.10.3. Anthropometry:

WHO anthropometry is software for using on disk tope personal computer using MS Windows it was developed to facilitate application of WHO child .growth standards in monitoring growth and motor developing in individual and population of children up to five years age.

WHO anthropometric consist of three modules?

Anthropometric calculator (AC)

Anthropometric assessment (AA)

Anthropometric survey (AS)

The children that enable to stand a floor board were used to measure their height .for all other weight was measuring using a measure tab carefully glued on wall.

In both cause height was measured to nearest 0.1 cm all children were measured bare foot and their posture was adjusted uniformity .For children that not able to stand weight was measuring using a hanging baby scale with a 15 kg capacity and was recorded to the nearest 100g. For older children mechanical dial weighing scale with 150kg using and their weight was recorded to nearest 0.5 kg .all children were weighted bare foot and wearing minimal cloth.

Mid upper arm circumference (MUAC) measures using SECA insertion tap and was recorded to the nearest 0.1 cm .All the measurement were performed by trained member. Body mass index (BMI) was calculated as the weight (in kg)/height<sup>2</sup> (in m). The world health organization (WHO) indicator was using for analysis. Indicator was used base on the following anthropometry indices : height-for-age-z-score (HAZ),weight –for-age-z-scor(WAZ),weight-for-height-z-scor(WHZ),BMI-zscor(BMIZ),How ever age-limit was no identical for all indicators: HAZ and BMI were available for children from birth utile 9years of age. And WAZ for children from birth until 10 years of age, and WHZ for the children from birth until 5years of age. .

### **2.11. the characteristic of malnutrition status indicators:**

Weight for age indicators gives an indication of nutritional problem in general This indicator not gives an indication of nutritional, problem whether it is chronic or acute, because weight was positively correlated with age and height .In other words, low weight can be caused due to children shortness (chronic) or because of diarrhea or others illness infection (acute).

Height /age indicator gives an indication of nutritional problem that are chronic or result situation that last longer for example: health behavior and foster care

patterns / poor feeding to children since born that result short children.

Weight /height and BMI/age indicators give an indication of acute nutritional problem as a result of event occurring in the note long term (short) , for example: disease outbreaks and malnutrition (hunger), which resulted in the child become thin .In addition to identifying thinness problems and weigh/age and BMI/age indicator can also give an indication of obesity .Thinness problem and obesity at early age me result in vulnerability to various degenerative diseases on adults (Barkers theory).

Acute and chronic nutritional problem is a problem that has characteristic that show acute and chronic nutritional problems pattern .an example is thin and short child.

### **2.11. Pathophysiology of malnutrition:**

Lack of adequate macronutrients or selected micronutrients, especially zinc, selenium, iron, and the antioxidant vitamins, can lead to clinically significant immune deficiency and infections in children. Under nutrition in critical periods of gestation and neonatal maturation and during weaning impairs the development and differentiation of a normal immune system. Infections are both more frequent and more often become chronic in the malnourished child. Recent identification of genetic mechanisms is revealing critical pathways in the gastrointestinal immune response. New studies show that the development of tolerance, control of inflammation, and response to normal mucosal flora are interrelated and linked to specific immune mechanisms. Nutrients act as antioxidants and as cofactors at the level of cytokine regulation. Protein calorie malnutrition and zinc deficiency activate the hypothalamic-pituitary-adrenal axis. Increased circulating levels of glucocorticoids cause thymic atrophy and affect hematopoiesis. Chronic under nutrition and micronutrient deficiency compromise cytokine response and affect immune cell trafficking. The combination of chronic under nutrition and



infection further weakens the immune response, leading to altered immune cell populations and a generalized increase in inflammatory mediators

(Adhikari RK. Krantz ME1997)

Marasmus: occurs when energy intake, intake of carbohydrates, is insufficient for the body's energy requirements. The body forced to draw on its own emergency stores. Liver glycogen is exhausted within a few hours, and skeletal muscle protein is then used via gluconeogenesis to maintain adequate amounts of blood glucose in the bloodstream. At the same time, triglycerides in fat depots are broken down into free fatty acids, which provide some energy for most tissues, but not for the nervous system, especially neurons in the brain, who rely on pure carbohydrates for energy. When near starvation is prolonged, fatty acids are incompletely oxidized to ketone bodies, which can be used by the brain and other organs for energy. Thus, in the severe energy deficiency of marasmus, adaptation is facilitated by high cortisol and growth hormone levels, in order to alert cells in the body that there is a state of high stress. Further adaptation is facilitated by depression of insulin and thyroid hormone secretion, because these hormones decrease blood sugar and increase energy consumption respectively. Because amino acids are mobilized from muscle to provide the liver with substrate for protein synthesis, plasma protein levels decrease less in marasmus than in kwashiorkor:

In kwashiorkor, relatively increased carbohydrate intake with decreased protein intake leads to decreased visceral protein synthesis. The resulting hypo albuminuria causes dependent edema, and impaired lipoprotein synthesis causes a fatty liver. Insulin secretion is initially stimulated but is reduced later in the disease. Fat mobilization and amino acid release from muscle are reduced, so that less amino acid substrate is available to the liver.

In marasmus and kwashiorkor, the insulin response to a glucose load is poor, possibly due to chromium deficiency.

Thus, infants require a higher proportion of essential amino acids, which are components of proteins the body cannot manufacture itself, in their diet than do adults.

In protein deficiency, adaptive enzyme changes occur in the liver, amino acid synthetases increase, and urea formation diminishes, thus conserving nitrogen and reducing its loss in urine. Homeostatic mechanisms initially

operate to maintain the level of plasma albumin and other transport proteins. The rates of albumin synthesis eventually decrease, and plasma levels fall, leading to reduced oncotic pressure and edema. Growth, immune response, repair, and production of some enzymes and hormones are impaired in severe protein deficiency ([WHO 2002](#)).

### **2.11.1 Pathophysiology of stunting**

The precise mechanism linking stunting to poor mental development is unknown. It is possible that the mechanism varies according to which nutrients are deficient, or that several mechanisms could act together. One possibility is that under nutrition causes poor motor development and apathy which in turn reduce a child's ability for environmental exploration and skill acquisition (Levitsky, 1979). Reduced activity has been described in iron, zinc and energy deficiencies. Another possible mechanism is that the children's small size could lead adults to treat them like younger children and not provide age-appropriate stimulation. Under nutrition could have a direct effect on children's central nervous system. Stunted children have smaller heads than non-stunted children, and in one study, head size in early childhood was a stronger predictor of IQ at seven years of age than other previous or current anthropometric measures al., A more speculative explanation is that raised

anxiety levels, as evidenced by heightened cortisol, could contribute to poor cognition and behaviour. (Simeon and Gra

ntham-McGregor, 1989

## **2.12. Complication of malnutrition:**

**2.12.1 Serious, infection:** especially septicemia or pneumonia gastroenteritis, Tuberculosis, measles and AIDs often precept kwashiorkor

**2.12.2 Heart failure:** due to a small, weak heart some time it occurring as Range management of dehydration or blood transfusion near malnourish children. (UNICEF 2010)

**2.12.3 Anemia:** due to folic acid and iron deficiency near children malnutrition occurring by some reason duo less iron in the food not taking vegetable in the food or malobserbction by diarrhea or existing of parasite near child. (UNICEF 2010)

### **2.12.4 Sudden death**

About 25% of children with kwashiorkor die despite treatment. The long-term effect of severe malnutrition on growth and mental development remain uncertain as these children are also affected by a deprived environment. Hypoglycemia, hypothermia, infection and heart failure are the main causes of death in severe malnutrition. (UNICEF 2010)

## **2.8.5 Hypoglycemia:**

Malnutrition, as with marasmus and kwashiorkor, is a common cause of hypoglycemia in third world countries. No storage energy from fats or proteins is available, and one is prone to low blood sugar values when not eating. (Iars –Indema 1998)

### **2.12.6 Hypothermia:**

Hypothermia is a reduction in the mean body temperature. In severe malnutrition, this complication is defined by the World Health Organization (WHO) as a rectal temperature below 35.5 °C (95.9 °F) or an underarm temperature below 35.0° C (95.0 °F). Preventing or treating hypothermia is an important step in the initial stabilization phase of the treatment of children with severe malnutrition<sup>1</sup>.

Malnourished children are susceptible to hypothermia because they have a lower metabolic rate and consequent heat production due to limited energy reserves; a larger body surface area per kilogram and fat losses resulting in less insulation and more heat loss; and infections which lead to insufficient energy available for thermoregulation<sup>2-6</sup>. Infants and children presenting with marasmus, lesions on a large part of the skin or severe infections are the most prone to develop hypothermia<sup>1,7</sup>, whereas the edema fluid of kwashiorkor acts as an insulator.

(Harris M, Salvosa CB 2009) .

### **2.13. Stunting complication:**

Child malnutrition impacts on education attainment. The degree of cognitive impairments is directly related to the severity of stunting and Iron Deficiency Anemia. Studies show that stunted children in the first two years of life have lower cognitive test scores, delayed enrolment, higher absenteeism and more class repetition compared with non stunted children. Vitamin A deficiency reduces immunity and increases the incidence and gravity of infectious diseases resulting in increased school absenteeism (FOA and UNICEF 2004)

## 2.14. Stunting and Mental Development

Stunting in poor populations is usually associated with poor mental development. However, the many socio-cultural and economic disadvantages that coexist with stunting (Martorell et al., 1988) may also detrimentally affect mental development. This makes it difficult to determine whether the poor development of stunted children is due to nutrition deficiency or whether stunting is just an indicator of poverty. Thus, it is important to control for social background as much as possible in study design and statistical analysis.

Most cross-sectional studies have found significant associations between height-for-age and children's cognitive development in preschool and school-age children. Even after controlling for socio-economic conditions, investigators have found significant associations between height-for-age and IQ, cognitive function and school achievement levels in school-age children in many countries. Significant associations have also been found between stunting and poor psychomotor development, fine motor skills and neuro-sensory integration. In populations with high levels of stunting, height in early childhood also predicts IQ at school age. Stunted children's cognitive function is more likely to be detrimentally affected by short-term hunger than non-stunted children.

(Simeon and Grantham-McGregor 1989)

The only supplementation study aimed specifically at stunted children was conducted with stunted and non-stunted Jamaican children aged nine to 24 months. The stunted children received nutritional supplementation for two years with or without psychosocial stimulation. Supplementation and stimulation produced independent benefits to the children's mental and motor development. The benefits from a combination of supplementation and stimulation were additive, and only the children receiving both treatments

caught up to the non-stunted control group in development levels. The implications of these findings are that at least part of the deficit in the development of stunted children is due to poor nutrition. However, both stimulation and supplementation are necessary to improve the development of stunted children to culturally appropriate levels.

(Simeon and Grantham McGregor 1989)

## **2.15. Brief about treatment of malnutrition:**

### **2.15.1 Treatment of malnutrition as severe inpatient:**

In the case of severe malnutrition as general:

1. Stabilization phase: purpose approach medical problem restoration of function of organ metabolism
2. Rehabilitation phase: increasing intake of protein energy and micronutrient gradually to child gain their weight.
- 3 Recovery phase: that child again gain weight and the appetite become well.

### **2.15.2 Treatment of malnutrition as moderate outpatient.**

1. Micronutrient supplement Multimicronutrient powders (Taburia
2. Therapeutic zinc supplement (as part of diarrhea treatment)
3. Advice mother home of complementary food (vegetable fruit food content of good protein and energy for the child.
4. Treatment of complication.

## **2.16. Treatment and prevention complication of malnutrition**

2.9.1 Infection :almost all the malnutrition children have the sign and symptom of infection by cause of their weakness of immune system just antibiotic administration is allowing for that malnutrition child that have lethargy, hypoglycemia and hypothermia administration of antibiotic like ampicillin, gentamycin, cotrimoxazol and dosage is according to weight of the child.

#### **2.16.1 Treatment and prevention of hypoglycemia:**

For the prevention of hypoglycemia for severe malnutrition every two hour must feed child even in the night several time give feed to the child that time we diagnosis as the hypoglycemia that blood level of glucose down less than 3mmol/dl in the blood so in this case we in level 3,5 teaspoon-full of drinking water with one teaspoon sugar mix give to malnutrition child feeding must be started soon .dehydration and infection must be treated if child is in confusion or collapse must given IV infusion of glucose in the dosage of 1ml/kg 50%glucose or 2ml/kg from 25%glucose given to the child if child not improving must be repeated this procedure

(Multi van Blumroder year 2000))

**2.16.2 treatment of Heart failure:** fluid overload is one of the important cause of heart failure some time heart failure by cause of wrong management become occur that example is in the above mentioned .

Supportive treatment is needed .with diuretics and digoxin and also anemia is one of the important cases of heart failure.

#### **2.16.3 Treatment of anemia;**

Folic acid like iron is necessary for blood formation it is found as floats in many foods such as green vegetable anemia result when there is no enough folic acid in the diet to meet the requirement. in the condition where there is an rapid blood-cell distraction and new cell must be produced there is an increase need for folic acid this happen in malaria, sickle cell anemia folic acid deficiency is often associated with iron deficiency . it is wise to give folic

acid to all anemic children and their mothers. This can be done by using tablet containing 30mg iron 0,2 mg folic acid which are available from UNICEF or can be brought commercially. .if not available 5mg /day daily for at least two weeks and give advice food containing folic acid and treat iron deficiency with ferrous sulfate 10-25mg daily for three month in the first two weeks folic acid must given alone. Blood transfusion must be conducted danger of overloading and causing heart failure just one that time shake with heart failure by anemia blood transfusion is necessary 10ml/kg in several hours with furosemide and digoxin(Yngve Hofvarder 1983)

#### **2.16.4 Treatment vitamin A deficiency:**

Vitamin A deficiency is one of the most common nutritional diseases among young children in developing country it usually associated with PEM xeroophthalmia night blindness photophobia conjunctivitis the most common cause of vitamin A deficiency treatment is the first dose is the first visit the second dose is the second visit and the third dose is one week after .

Child less than 6month 50000unit

Child 7-12month 100000unit

Child over one year 200000uni

( multi van Blumroder year 2000))

#### **2.16.5. Treatment of Vitamin D deficiency:**

Because vitamin D is formed in the skin through the action ultraviolet ray the children that living in large city they less face to sun ray mother avoid sunlight may develop osteomalacia which can deformities of the pelvis bone ,tetanic, pain, and sudden fracture. From about four month of age, deficiency of vitamin D effect the growing of bone the ribs become miss-shape-a condition called a rachitic rosary –and the end of long bones enlarge near the wrist and ankle. the pelvic bones are deformed and this me can complication in the



future girls in the future during child birth .the deficiency is best prevented by exposing the skin of any part of the body to the some sunshine each say some times it may be necessary to give vitamin D 100-5000IU (25-125microgram per day by month for two weeks and follow with 400IU per day for tow month.( Yngve Hofvarder 1983)

#### **2.16.6 Iodine deficiency:**

Iodine is an important trace element if a child deficiency in iodine child will be mentally subnormal to some degree Cretinism (deaf-mutism, mental retardation abnormal motor development only fund near children iodine deficiency for preventing iodine deficiency encourage the consumption iodinated salt in the food to community.( Yngve Hofvarder 1983)

#### **2.16.7 Vitamin and mineral deficiency:**

Mineral and vitamin is necessary for the growing children so for the children must give vegetable fruit with their daily food or if family is more interest give them multivitamin mineral for malnutrition children specially vitB12 mineral like zinc 2mg/kg copper 0,2mg/kg for malnutrition children (Dr multi van Blumroder year 2000)

#### **2.17. Promotion and prevention of malnutrition.**

The objective of such a program some of the objective that one might consider include; detection of early sign of malnutrition in order to take immediate action. Reduction of frequency and severity of infection diseases Improvement of nutritional status of particularly through adolescence, pregnancy and lactation Education of the number of low birth weight infants and prenatal mortality and morbidity Spacing of pregnancy at the reasonable interval (united nation FAO2010))

### **2.17.1 Incorporating nutrition objectives into development policies and programs.**

Government actions to improve household food security Food security may be influenced by anything that governments do,-to improve income and reduce poverty;-to increase agricultural production, especially by poor rural families;-to ensure prices that are fair to producers and consumers;-and to make services available to people.

### **2.17.2 Assessing Analyzing and monitoring the nutrition situation.**

, it is possible to see the causes of malnutrition in different guise. At the level of factories to produce and forficate foods for the customer and food security assessment at level of community and household, to know the quality hygiene and security of food in all level food production.

### **2.17.3 Preventing and managing infectious diseases,**

Ensuring Adequate Quantity, Quality & Frequency of food Treatment / Control of infections / diseases creating a supportive environment both for the child & mother

### **2.17.4 Promoting appropriate diet and healthy lifestyles,**

By conducting strategy by government and ministry of health and other medical provider to conduct promotion and education program at all level of health facility, community empowerment. And announcement by media by improving healthy lifestyle and behavior change to family and household.

### **2.17.5 Promoting breastfeeding,**

Encourage family mother for to exclusive breast feeding for the child up to the time that child need to breast feeding. Preventing specific micronutrient deficiencies The food mast have content of specific micronutrient specially

during weaning period. Must give for child vegetables fruit and extra vitamin and mineral like vitamin A iron folic acid salt of iodine

### **2.17.6 Availability of food for the poor family**

governments do,-to improve income and reduce poverty;-to increase agricultural production, especially by poor rural families;-to ensure prices that are fair to producers and consumers;-and to make services available to people.

### **2.17.7 Improving household food security, at the household.**

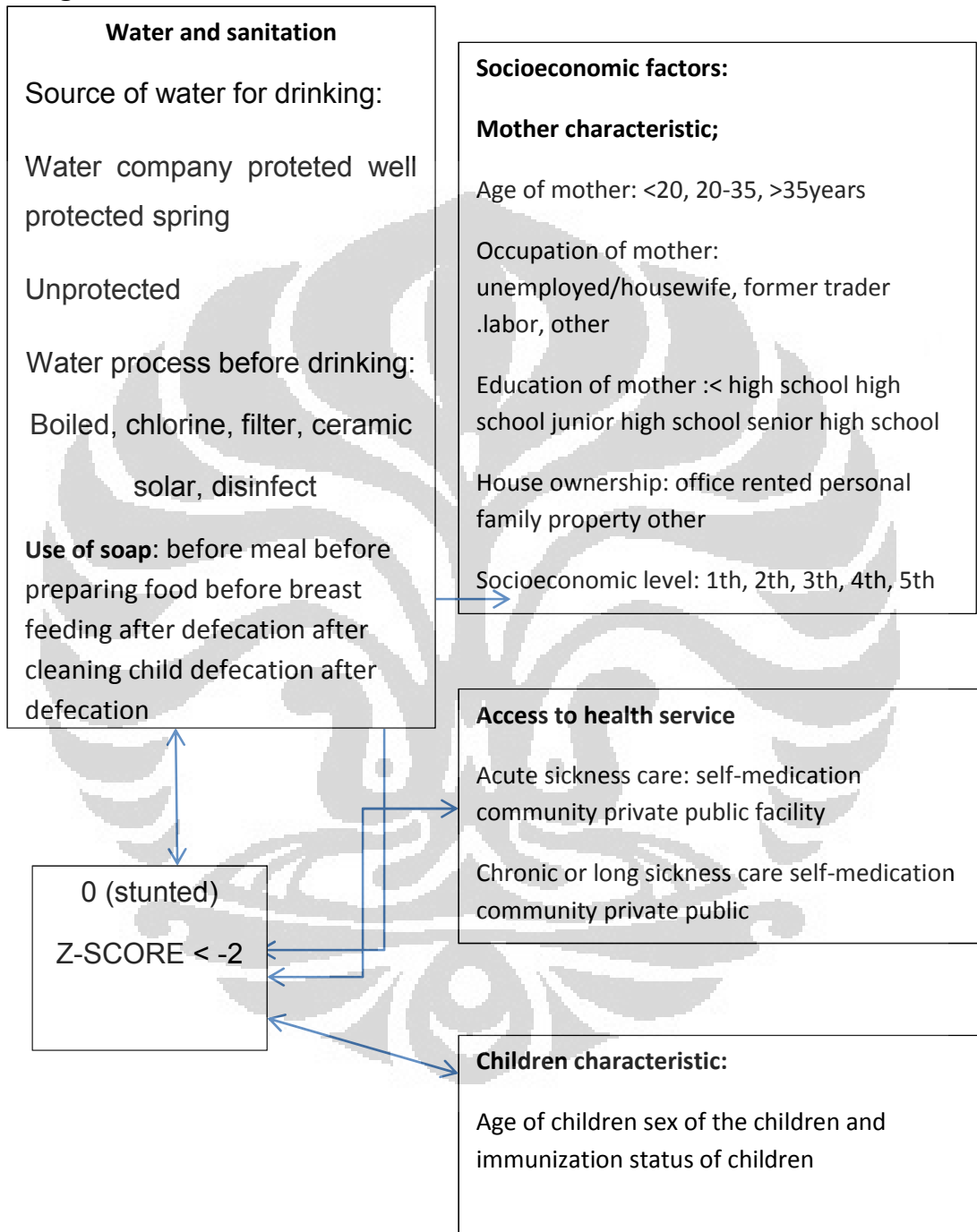
Food security is defined as access to food that is adequate in terms of quality, quantity, safety and cultural acceptability for all household members.( united nation FAO 2010.

Theoretical frameworks:

In the theoretical framework diagram stunting is dependent variable while socioeconomic (age, education. occupation of mother, house ownership, socioeconomic level of the family)in water and sanitation factors safe water for drinking(water Company, protected dug well, protected spring, sealed packed water, and refilled packaged) water process before drinking(Boiled, chlorine, filter, ceramic, solar, disinfect) in use of soap (: before meal before preparing food before breast feeding after defecation after cleaning child defecation after defecation.

In access to health service factors in acute sickness care (self-medication, community medication, government facility, private facility) and chronic and prolonged sickness care factors(self-medication, community medication, government facility, private facility and in the children characteristic (immunization status of the children, age of the children, and sex of the children are independent variables.

## Diagram of theoretical framework



## Chapter 3

**3.1 conceptual frameworks:** many deferent study has been done to association of factors like poverty with stunting and socioeconomic factor also access to health factors with stunting but in because we choose here many element and factors to collectively to knows the relation with stunting and also some factors like all vaccination compellation how have to association with occurrence of malnutrition and also some other variables that in these study we will analysts and test the association result

The focus this study is to assess the relationship socioeconomic, water and sanitation, access to health services, immunization status with children malnutrition (stunting) in mother household.

**Diagram 3.1 Conceptual frame work diagram**

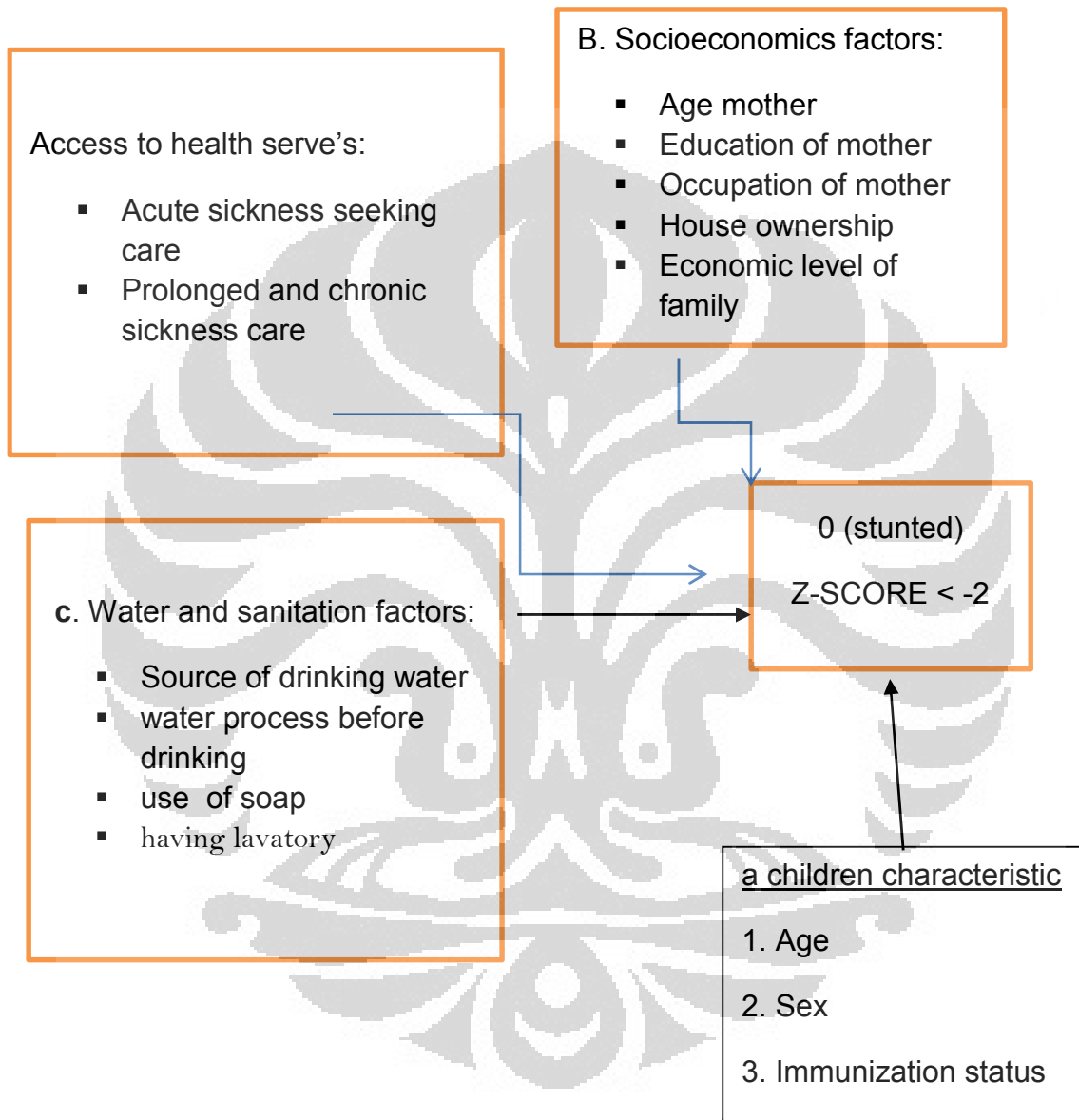


Table 3.1 operational definition independent variable socioeconomic

Variables	Operational definition	Scale	Scale measurement	Tool measurement	Measurement method
mother characteristic					
Age of mother	Age of mother according their reproductive capability	<20 years old 20-35.years old >35 years old missing	Categorical	qieushsner	Asking
Education of mother	The level of education of mother in the household	<= primary school primary school junior high school >=senior high school	Categorical	qieushsner	Asking
Occupatio	Occupation	unemployed	Categorical	qieushsner	Asking

n of mother	of mother that result in financial outcome	/housewife farmer trader/laborer/civil/private/other	al  /nominal		
House ownership	Are the house is ownership by family or note	rent/office/other Personal /family property.	Categorical/ al/	Qieushsner	asking
House good	Economic status of the family	1th q: poorest 2nd q poor Medium 4th q rich 5th q: richest	Categorical/ al/ Ordinal	Qieushsner	Asking and observing



Table 3.2. variables related to water and sanitation factors variables

Conceptual definition variable	Operational definition	Scale	Scale measurement	Tool measurement	Method measurement
Water and sanitation					
Source of water for drinking	Witch source of water is safe and witch one are unsafe	water company protected well protected springs unprotected	Categorical/	qeishner	Asking observation
Use of soap	Hygiene activity of mother regarding her children	Before meal, before breast feeding, before feeding child, after defecation, after cleaning defecation child, other	Categorical	qeishner	Asking observation
water process before drinking	Witch procedure make safe water for the family	boiled, chlorine, filter, ceramic, solar, disinfect	Categorical/	qeishner	Observing and asking

Table.3. 3 variables related to access to health service:

Variable	Operational definition	Scale	Scale measurement	Tool measurement	Method measurement
Access to health services					
Acute sickness seeking care	Use family from services when they got illness	self-medication government private community	quieter	Asking	
Chronic or prolonged sickness care	If sickness prolonged where family seeking medicine	self-medication government private community	Qieshner	Asking	

Table 3.4 independent variables children characteristic

Variable	Operational definition	Scale	Scale measurement	Tool measurement	Method measurement
Age of the children	Age of the children months or years	<12 months 12-36 months 36-59 months	Categorical ordinal	questioner	Asking
Sex of the children	Male or female		Categorical nominal	Questioner	Asking observing
Immuni zation status of the children	BCG, polio, DPT hepatitis H-influenza	complete d not complete d	Categorical binary	Questioner	Asking checking cards vaccine registrar

### 3.5. Dependent nutritional status of the children:

Variable	Operational definition	Scale	Scale measurement	Tool measurement	Method measurement
Stunted	Height/age	1.normal 2.stunted	Categorical	Questioner	Anthropometry

### 3.3 Hypotheses:

Socioeconomic variables:

- 1 there is relationship between age of mother and stunting.
- 2 there is relationship between occupation of mother and stunting.
3. There is relationship between education of mother and stunting.
4. There is relationship between family house ownership and stunting.
5. There is relationship between family socioeconomically status and stunting.

3.3.2 Water and sanitation variables:

1. There is relationship between source drinking water and stunting.
2. There is relationship between use of soap and stunting.
3. There is relationship between water process before drinking and stunting.
- 4 there is relationship between having lavatory with stunted.

Access to health service variables .

1. There is relationship between acute sickness care from government private or community self-medication with stunting.
2. There is relationship chronic or prolonged sickness care from government private or community and self-medication with stunting.

#### Characteristic of children

1. Immunization status: is there relationship between completing or not completing vaccine according to age of the child with stunting.
2. Sex of the children: is there relationship between sex of the children and stunted.
3. Age of the children: is there relationship between age of the children with stunted.

## Chapter 4

### 4.1 research design

Secondary data form center for health research university of Indonesia (CHR\_UI) with coordination of UNICEF was used in this study.

Cross sectional study approach has been used to collect data from household mother .quantities data was collected by using predesigned finalized questioner of center for the health research University of Indonesia with coordination of UNICEF.

### 4.2. Study location and time

The study site of this study is SIKKA and LOMBOK District) Timor Province in 9-jun- 2007

### 4.3. Sample of. Study population

The study sample is 2493 mother who have children 0-59 month subject in this study they measured their height weight and age by anthropometry measurement in Sikka and Lombok Districts in Timor province which was calculated randomly by proportion formula  $\alpha=5$  (level of significant)

And  $\beta=80.45$  %( power).

The sample size for household survey is 588 infant aged 0-6 months and 635 children aged 12-59 months in each district. The sample infants and children were spread out in 42 villages in 6 Health center coverage areas in each district. The 6 Health center were functioned as stratification, since 2 Health center was in central of the district, 2 Health center was the fairest Health center and the other 2 is in between. This stratification is done in order to minimize bias, as sample will come to 3 types of puskesmas. In each puskesmas, 7 villages were selected with probability proportionate to size to ensure that each infant and children in Sitka has equal probability to be selected as sample for this survey. Then in each selected village quick census was done to create a sampling frame of infant 0-6 months and children 12-59 months. Fourteen infant 0-6 months and 16 children 12-59 months was randomly selected in each selected village/ In summary, for each district, the sample was 6 puskesmas, 42 villages and 588 infants 0-6 months and 635 children 12-59 months.

#### 4.2.1 Eligible criteria:

All household mothers who have less than five years children lived in mentioned sikaka and Lombok district.

**Exclusion criteria:** those mothers who did not provided consent.

#### **. Data collection:**

In this study, the data previously has been collected used as secondary data according to study objectives.

#### **4.4 .data processing:**

The previous data which was collected by the center of health research university of Indonesia (CHR-UI) with coordination UNICEF by title of basic human services baseline household survey by a formal letter from UI administration by signature of my advisor we got data from research center in these study our focus will be only to those factors water and sanitation, access to health serve's, socioeconomic factors and immunization factor variables of household which have relationship with malnutrition stunting among their under five children in Sikaka district.

#### **4.5. Data analysis:**

In this study we analysis secondary data for unvaried, bivariate and multivariate analysis by stata 2010 software was carried out to assess the household factors water and sanitation, access to health services, socioeconomic factors and immunization variable with stunting among their under-five age children.

## **Chapter 5**

### **5.1 Result:**

this study was a cross sectional study use secondary data which was collected by the Center of Health Research UI in one base -line household survey for our purpose in this study to assess the relationship of factors socioeconomic, water and sanitation, access to health service, and

immunization status of the children among under five year children with stunting. In descriptive study we describe the number and percentage in every variables in categories. In numeric variables mean standard deviation minimum and maximum of variables.

Two thousand four hundred ninthly tree (2493) samples aged 0-59 month children participated in this study and measured for stunted by using anthropometric tool.

Table.5.1. distribution of children based on nutrition status

Nutrition status	Number	%
Normal	1,358	54.47
Stunted	1,135	45.53
Total	2,493	100.00

Table 5.1.1 above shows that from 2493 children measured 1135 of them are stunted that stunted 45.53% of the all children that measured in this study. And 1358 children that become 54.47 % are normal.

**5.2. Univariate analysis: descriptive analysis in table below 5.1.2**

**5.3. Children characteristic:**

According to child characteristic in table 5.1.2 high percentage of the children below 12month are 1169(46.89%) and age of 12-36 month is 882(35,38%) median and 36-49 month are 442(17.73 %) have less percentage of total children.



According to the sex 1269(50.9%) female children and 1229(49.10%) male child

About immunization status of children 1515(60.77%) children not completed immunization and 978(39.23%) completed immunization it show the number of children not completed vaccination are high percentage than completed children.

#### **5.4. Socioeconomic and mother characteristic:**

age of mother :according the mother age less than 20 years 196(7.86%) age of 20-35year are 1694(67.95%) high percentage between all. more than 35years age 13,44%) are the medium mother population.

**education of mother:** mother in less than primary school is 783(31.41%) and mother in primary school is 766(30.73%) and mother of in junior high school are 520(20,86%) mother in senior high school are 242(17.01%) .

So the mother who has senior and junior school is less % then primary school.

#### **Occupation of mother:**

Unemployed /housewife are 1792 (71.88%) and farmer is 446(17.89%) and trader laborer/civil/private/other is 255(10.22%).So unemployed mother are in high percentage than employed mothers.

**House ownership:** the rented/office/other are 612(24.55%) and personal/family property are 1881(75.45) it show the high % house is belong to family wealth.

5.1.3.5. According to socioeconomic level the poorest are 585(23.47%) and the pore are 439(17.61%) and medium level are 506(30.30%) the rich people are 468(18.77%) and the richest are 495(19.86%) so the high percentage children are poorest people.

## 5.5. Water and sanitation factors:

### 5.1.4.1 Source of drinking water

Water from company is 521(20.9%) protected well 880(35.30) and protected spring 772(28.96%) unprotected water 370(14.84%) so many people used from protected well and only less people is used unprotected water.

**Water process before drinking:** Boiled chlorine, filter, and ceramic, solar and disinfect.

People used from this protected water 2067(82.91) and people none used from this process 426(17.09%).

### Use of soap

Use of soap for mother hygiene activity:

Only 347(13.92 mother non using soap and large percentage mothers 2146(86.08) using soap during hygiene activity.

Use soap before meal: 1249(50%) using and 1244(50%) not using soap before meal.it show the equal percentage.

use of soap before breast feed: large number of mother not using soap before breast feed 2226(89,29%) less mother using soap before breast feed 267(10.71%).

Use of soap before feeding: many mother not used 2269(91.01%) less mother used 224(8.99%). Soap before feeding

Use of soap before preparing food large number of mother not used 2128(85.36) just only 365(14.64 %) mother used soap before preparing food.

Use of soap after defecation: many mother not used 1771(71.04%) just 772 mother used 772(28.96%) used soap.

Soap after cleaning child defecation: 1785(71.6%) mother note used soap and 708(28.40) lees number using soap.

Type of lavatory: 993(37.42%) with septic tank and 583(23.39) without septic tank using another type of lavatory and 997(39.19%) no lavatory.

**5.6. Access to health service factor:**

5.1.5.in the term of acute illness care they using 409(61.14%) self-medication 882(32.29%) go to government facility 94(3.77) go to private clinic and large number of 1168(46.85%) go to community facility.

5.1.5.2 if their sickness prolonged are become chronic 222(8.90%) self-treatment, 1690(67.79%) including large number go to government facility and 304(12.19%) to private clinic or hospital and 227(11.11%) go to community medication.

Table 5.2 **Characteristic of children in descriptive analysis:**

Variables	Number	%
Age of the children		
<12 months	1,169	46.89
12-36 months	882	35.38
36-59 months	442	17.73
Sex of the children		
Female	1,269	50.90
Male	1,224	49.10
immunization of the		

children		
not complete	1,515	60.77
completed	978	39.23

Table 5.3 socioeconomic factor univariate analysis

<b>Socio economic and mother characteristic</b>		
<b>Age of mother</b>		
<20 years old	196	7.86
20-35 years old	1,694	67.95
<35 years old	335	13.44
Missing	268	10.75
<b>Education of mother</b>		
<= primary school	783	31.41
primary school	766	30.73
junior high school	520	20.86
>=senior high school	424	17.01
<b>occupation of mother</b>		
unemployed/housewife	1,792	71.88
farmer	446	17.89

trader/laborer/civil/private/other	255	10.23
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Table 5.3 socioeconomic univariate analysis

<b>Socioeconomic economic level part2</b>		
<b>house ownership</b>		
rent/office/otherasc	612	24.55
personal/fa	1,881	75.45
<b>Economic level of family</b>		
1th q: poorest	585	23.47
2nd q	439	17.61
Medium	506	20.30
4th q	468	18.77
5th q: richest	495	19.86

Table 5.4 water and sanitation factor univariate analysis

Water and sanitation		N	%
Source of drinking water			
water company		521	20.90%
protected well		880	35.30%
protected springs		722	28.96%
unprotected		370	14.84%
water process before drinking: boiled, chlorine, filter, ceramic, solar, disinfect			
Yes		2,067	82.91
No		426	17.09
C3 use of soap for mother hygienic activity			
No		347	13.92
Yes		2,146	86.08
use soap before meal			
No		1,249	50.10
Yes		1,244	50.10

Table 5.8 water and sanitation univariate analysis

<b>Water and sanitation factors use of soap before breast feeding</b>		
No	2,226	89.29
Yes	267	10.71
C3-3 use soap before breast feeding children		
NO	2,269	91.01
Yes	224	8.99
use soap before preparing food		
NO	2,128	85.36
Yes	365	14.64
use soap after defecation		
No	1,771	71.04%
Yes	722	28.96%
Use of soap after cleaning child		
NO	1,785	71.60%
Yea	708	28.40%

<b>Lavatory</b>		
with septic tank	933	37.42
without septic tank	583	23.39
no lavatory	472	48.31

Table 5.5 access to health service univariate analysis

<b>Access to health service factors</b>		
if they became sick		
self-medication	409	16.41
government	822	32.97
private	94	3.77
community	1,168	46.85
If sickness prolong		
self-medication	222	8.90
government	1,690	67.79
private	304	12.19
community	277	11.11



## 5.2 bivariate analyses

The bivariate analysis show one by one association independent variables with dependent variable stunting that how match significant association are between dependent and independent variables will describe the proportion stunted in every category and p-value significant.

### 5.2. Characteristic of children:

. According to age of the children 36-59 month have high proportion stunting (66.20%)the children less than 12month have 25.41%) and 12-36moth that have 61.79%) stunted .there is significant association between age of children and stunting p-value 0.000.

According to the sex children 48.69% were male stunted and 42.47% were female stunted there is significant association between age of the children and stunted p-value 0.002.

according to immunization status the children who completed immunization 62.27% are stunted compere to children not complete immunization 34.72% are stunted there is significant association between immunization status and stunting (p-value 0.000)

Table 5.6 result of bivariate analysis children characteristic

Characteristic of the children	Normal		Stunted		p-value
	N	%	N	%	
Age of children					
<12 months	872	74.59	297	25.41	0.000
12-36 months	337	38.21	545	61.79	
36-59 months	149	33.71	293	66.29	

Sex of the children					
Female	730	57.53	539	42.47	0.002
Male	628	51.31	596	48.69	
<b>Immunization status</b>					
Not complete	989	65.28	526	34.72	0.000
Completed	369	37.73	609	62.27	

### 5.3. Socio economic factors

: Mother characteristic:

.According mother age group the proportion of mother more than 35years have higher proportion of children stunted 55.82% than mother age 20-35 have 42.92% stunted and mother less the 20year have 40,31% stunt children. There is significant association between age of mother more than 35years have significant association with stunted p-value 0.001and have risk of 1.87time more to stunting

. According to mother education high proportion of mother have primary or lees than primary education have 50.19% higher proportion of stunted children than respectively primary education 46.21% junior high school 42.12% and more than senior high school is 39.86 stunted children there is significant association between education mother and stunt p-value 0,001).

. Occupation of mother : according to occupation high proportion mother they are farmer have high proportion of stunted children 50% respectively the mothers are unemployed 44.74% and mothers trader/laborer/civil have 43.14 % stunted children there is significant association between occupation of

mother and stunt p-value 0.047) their farmer mother have 1.23time more risk to stunting.

Economic condition:

House owners: according house condition the family that house are family property have high proportion of stunt children 47.21% than family have rented or other house have 40,36%stunt there is significant association between house ownership and stunt p-value 0.03 the family using family property house have 1.23time more risk to stunted children

according socio economics status of family : according to economic level that family who are poorest have high proportion of stunted 49.40% the respectively 2<sup>nd</sup> q 49.2% medium 47.04% 4<sup>th</sup> 41.03% and richest 40.40% stunt children there is significant association between socioeconomic of the family with stunting p-value 0.004.

Table 5.7 socioeconomic bivariate data analysis

Socio-economic	Normal		Stunted		p-value	OR
	N	%	N	%		
<b>Age of mother</b>						
<20 years old	117	59.69	79	40.31		1
20-35 years old	967	57.08	727	42.92	0.484	1.11
<35 years old	148	44.18	187	55.82	0.001	1.87
Missing	126	47.01	142	52.99	0.007	1.67
<b>Education of mother</b>						
<= primary school	390	49.81	393	50.19		1
primary school	412	53.79	354	46.21	0.117	0.85
junior high schoo	301	57.88	219	42.12	0.004	0.72
>=senior high schoo	255	60.14	169	39.86	0,001	0.66

<b>Occupation of mother</b>						
unemployed/housewife	990	55.25	802	44.75	0.004	1
Farmer	223	50	223	50	0.047	1.23
trader/laborer/civil/	145	56.86	110	43.14	0.627	0.94
<b>House owners</b>						
rent/office/other	365	59.64	247	40.36	0.003	1.32
personal/family prope	993	52.79	888	47.21		
<b>Socio –economic status</b>						
1th q: poorest	296	50.6	289	49.4		
2nd q	223	50.8	216	49.2	0.950	0.99
Medium	268	52.96	238	47.04	0.435	0.91
4th q	276	276	192	41.03	0.007	0.71
5th q: richest	295	59.6	200	40.4	0.003	0.69

#### 5.4. Water and sanitation factor:

Source of drinking water: according water source high proportion of stunting is among that family using protected spring 55.44% stunted children respectively using protected well 41.36% and Water Company 40.27% stunted. And unprotected 40, 27%

There is significant association between source of drinking water and stunted (P-value =0.000).

Water process before drinking:

according to water process before drinking high proportion of stunted not proceeding the water before drinking 46.01% and 45,43% stunt that processing the water there no significant association between water processing and stunted(p-value 0.826).

Using soap during mother hygiene activity:

The proportion stunting are among mother who using soap during hygiene activity 46.27% than that mother who not using soap in hygiene activity 40.92%.ther is no significant association between mother hygiene activity and stunting (p-value=0.063 but mother who not use soap during hygiene activity have 1.24 time to stunting.

Use of soap before meal: there is high proportion of stunting between using and non-using of soap before meal non using 45.88% and. Using soap before meal 45.18% stunting. There is no significant association between use soap before meal and stunt ( p-value= 0.726.

Using soap before breast feeding: the proportion of stunting among using soap before breast lower 35.21% than non-using of soap 46.77% there is significant association between use soap before breast feeding with stunting(p-value =0.000).

Using soap before preparing food: there is deferent proportion of stunting between use of soap before preparing food 46.85% not using soap 45,30% there is no significant association between using soap before preparing food and stunting.(p-value 0.583.).

Use of soap after defecation: there is deferent proportion stunting who not using soap after defecation 48.61% lower than using 44.74%stunted there is no significant association between uses of soap after defecation with stunting p-value= 0.04).and non-using soap after defecation have 1.19 time more risk to stunted.

Use of soap after cleaning child defecation: that mother who not use soap after defecation of children have lower proportion stunted children 44.87 % than who using soap have higher stunted children 47.18 % there no significant association between stunting and use soap after cleaning child defecation (p-value=0.298).

Having lavatory:

There is high proportion stunted among family do not have lavatory 48.31% with septic tank 45.44% and without septic tank 40.99% there is no significant association with having lavatory but that people that note using lavatory have risk of 1.2 time to stunting Table 5.8 water and sanitation bivariate data analysis

Water and sanitation factors	Normal		Stunted		p-value	OR
	N	%	N	%		
<b>Source of drinking water</b>						
water company	299	59.73	222	42.61	1	1
protected well	516	58.64	364	41.36	0.648	0.95
protected springs	322	44.6	400	55.4	0.000	0.67
Unprotected	221	59.73	149	0.27	0.485	0.91
<b>Water process before drinking</b>						
Yes	1,128	54.57	45.43	45.43	0.826	0.98
No	230	53.99	196	46.01		
<b>Use of soap for mother hygiene</b>						
NO	1,153	53.73	993	46.27	0.063	1.24
Yes	205	59.08	142	40.92		
<b>Use of soap before meal</b>						
No	676	54.12	573	45.88	0.726	0.97
Yes	682	54.82	562	45.18		

<b>Use soap before breast feeding</b>							
NO	1,185	53.23	1,041	46.77	0.001	0.62	
Yes	173	64.79	94	35.21			
<b>Use of soap before preparing food</b>							
NO	1,164	54.7	964	45.3	0.583	1.06	
Yes	194	53.15	171	46.85			
<b>Use of soap after defecation</b>							
Yes	987	55.73	784	44.27	0.048	1.19	
No	371	51.39	351	48.61			
<b>Use of soap after cleaning child defecation</b>							
no	984	55.13	801	44.87	0.298		
Yes	371	52.82	334	47.18		1.01	
<b>Lavatory</b>							
with septic tank	509	54.56	424	45.44			
without septic tank	344	59.01	239	40.99	0.089	0.83	
no lavatory	505	51.69	472	48.31	0.210	1.12	

### 5.5 Access to health services factor:

According to seeking in acute care: the proportion of stunting is higher in using community services 47.86 respectively self-medication 45.72% government 43.07% and private 37.2 % stunted there is no significant association between seeking of health services and stunting (p-value 0.066).and community have risk of 1.09 time to stunted

### Sickness prolonged or chronic where they go:

According to sickness prolongation and seeking care the proportion of stunting is higher in self-medication 45.05% government is 44.91% and

private is 42.11% and community is 45.53% there is significant association between prolonged sleekness and stunting p-value 0.01 and community have risk of 1.4 time to stunting

Table 5.9 bivariate access to health service data analysis

Access to health services	Normal		Stunted		p-value	OR
	N	%	N	%		
<b>Access to health service when got illness</b>						
<b>self-medication</b>	222	54.28	187	45.72		
Government	468	56.93	354	43.07	0.377	0.89
Private	59	62.77	35	37.23	0.136	0.70
Community	609	52.14	559	47.86	0.456	1.09
<b>If sickness prolonged where you go</b>						
Self-medication	122	54.95	100	45.05		
Government	931	55.09	759	44.91	0.970	0.99
Private	176	57.89	128	42.11	0.502	0.88
Community	129	46.57	148	45.53	0.063	1.40



## 5.6. Multivariate analysis:

the name indicates, multivariate analysis comprises a set of techniques dedicated to the analysis of data sets with more than one variable or multivariate is the simultaneous analysis of three or more variables. It is frequently done to refine the bivariate analysis, taking into account the possible influence of a third variable on the original bivariate relationship. Multivariate analysis is also used to test the joint effects of two or more variable upon a dependent variable. The independent variables which were significant in the bivariate analysis of this study will be shifted to the multivariate analysis to see the joint effect of more variable on the outcome variable.

Table 5.10 result multivariate analysis

Variables	Coef.	OR	Sig	CI (95%)	
				lower	Upper
<b>Children characteristic</b>					
Sex of the children (male)	1.610	1.30	0.001	1.11	1.54
<b>Socio economic status</b>					
Age of mother <20years	0	1	0.668	4.12	6.07
Age of m 20-35 years	1.610	1.76	0.002	4.12	6.07
Age of >35years	1.811	1.57	0.020		
<b>1th q: poorest</b>	0	1	0.001	0.45	0.77
2nd q	0.007	1.0044	1.03	0.61	1.04
Medium	0.221	0.903	0,90	0.52	0.90
4th q	0.372	0.737	0.74	0.45	0.77
5th q: richest	0.525	0,689	0,71		

<b>Sanitation factor</b>					
use soap	1.456	1.5	0.004	1.12	1.88
<b>Access to health service</b>					
Self-medication	0	1	0.028	1.04	2.28
Government	0.016	0.689	0.982	.746	1.33
Private	0.205	0.991	0.965	.746	1.419
Community	0.437	1.36	0.096	0.946	1.96

After excluding step by step large p we got the most significant and strong association variables related to stunting.

According to multivariate analysis (table 5.3.6) we can conclude

According to this study the above factors are the predictors for the stunted after control of other variables sex of the children the male sex have more risk (OR=1.2) time to stunting than female children and have significant association (P-value 0.003) with stunting.

After control of other variable mother age the mother who have in age of 20-35 years OR=1.76 time more to risk of stunted and the mother who are the age <35 years OR=1.57 time to the risk of stunting than mother who age are less than 20 years no risk to stunted. There is significant association age of the mother 20-35 p-value=0.002 and the mother <35 years significant association with stunted p-value=0.020

After control of other variable According to socioeconomic the family they are poor OR=1.004 time the risk of the stunting then poorest that have no risk to stunting and the medium and rich and richest have lesser risk to stunting there is significant association with poor family level with stunting (p-value=0.004)

After control of other variables According to the use of soap in sanitation activity that mother who not use soap OR=1.5 time the risk of stunted than mother who no use soap. There is significant association with use soap with stunted p-value=0.004.

After control of other variables According to health service that people that community- medication have OR=1.3 time risk of stunted and self-medication no risk to stunted and government and private care seeking is leaser risk to stunted. There is no significant association with service utilization with stunted p-value=0.096

## Chapter 6

### 6.1 discussions

As mentioned in this study our topic is about stunting and occurrence of stunting in Indonesia especially in Sikka and Lombok district because of stunting is one of the public health priorities in the Indonesia. as mentioned in background prevalence of stunting has decreased from nearly 47% in progress in the reduction of stunting has been made in Southeast Asia, Child stunting is a result of long-term chronic consumption of a low-quality diet in combination with morbidity, infectious diseases, and environmental problems (Rechard Semba and Martin W Bloem, 2008)

Stunting is associated with poor cognitive, motor, and socio-emotional development, and increased mortality. Stunted children do not reach their full growth potential and become stunted adolescents and adults. The functional consequences of stunting continue in adulthood, with reduced work capacity and, increased risk of mortality during childbirth and adverse birth outcomes.

In one household survey data .In 2001, showed that prevalence of stunting was 46% in Indonesia (problem statement Jenis Berkas 2007)

So in this study according to our objective we want to assess the

relationship of socioeconomic, water and sanitation hygiene, access to health services and immunization status of the children health determinant against in occurrence of stunting among their under five years children in Sikka and Lombok Tengah district in Indonesia.

Our data in this study is secondary data from Research center of faculty of public health by support of UNICEF in one house hold base-line survey collected used cross-sectional method design for the collecting data totally 2492 subject children under five years are measured for nutrition status we using from this data to our objective purpose by using of stata 2010 mad descriptive bivariate and multivariate analysis to get the outcome of our objective. We will disuse here multifactor association and relation with occurrence of stunting.

### **6.2 distribution stunting**

According to nutritional status among 2493 children under five 45.53% are stunted and 54.47 % are normal children it show that almost half of the children in this study is stunted.

### **6.3. Children characteristic:**

Age of the children: According to child age we categories in three category age respectively <12month, 12-36month, and 36-59 that high proportion of stunting is in <12month stunted low proportion were in 36-59 month it show that stunting is effect of intrauterine meaning rooted to mother physical and mental and social health during pregnancy and care and feeding of children in infancy and exclusive breast feeding during infancy have greater role in cause of stunting and age of the children have significant association with stunting (p-value =0.001).

Also some study that don by( Beka Teshome, Wambui Kogi-Makau) show the significant association of age <12 with stunting (p-value=0,002) that have high risk to stunting Children who had not received colostrum after delivery were at higher risk of stunting. The study finding showed that children who had not received colostrum were 2.1 times more likely to be

stunted as children who had been fed colostrum. The model also showed that duration of breastfeeding was associated with the risk of stunting. Children who had been breastfed for 12-24 months were 2.2 times more likely to be stunted than children who had been breastfed less than one year. It is because of mother that just they using breast milk without complementary feeding after age 6 month for their children and starting late complementary feeding for their child. It was also observed that the likelihood of being stunted was significantly higher for children who started complementary feeding beyond the age of 12 months. As compared with children in the age group 4-6 months, the risk of stunting was 2.2 times more for children who started weaning beyond one year

(Beka Teshome, Wambui Kogi-Makau) magnetite and determinant of stunting 2009)

**6.3. Sex of the children:** according bivariate analysis between sex of the children male have high percentage of stunting then female it show that male is more high risk then female and sex have significant association with stunting  $p$ -value=0.002. Few studies showed boys are more malnourished than girls A study in Gaza strip on the other hand revealed no gender difference in the nutritional status between boys and girls The finding of this study revealed that male children face nutritional disadvantages compared to female children. This leads to an argument that sex preference is practiced by mothers the differences may be attributed to unmeasured factors such as parental care-giving behaviors. In light of the fact that males are more likely to be stunted than females in sex-related differences in diet and child care require further exploration.

So in our study distribution female and male is almost equal why male is in high risk then female it need more investigation. several study reveals that in 10 countries in sub-Saharan Africa, male children below five years of age are

more likely to become stunted than their female counterparts. An inconsistent pattern was observed where sex differences in stunting tended to be more pronounced in the poorest, socio-economically. Even though the study advances knowledge on the understanding of early childhood health inequalities, it raises interesting issues that mandate further research.

, it also could be attributable to potential biases. On average 25% of data on stunting was missing in all the studies. Therefore, the tendency for more boys than girls being stunted in the 2<sup>nd</sup> quintile rather than in the 1<sup>st</sup> quintile theoretically, there could be other sources of bias in the study. First, systematic errors with the measure could lead to the observed systematic sex differences. The NCHS/WHO growth reference has separate references for males and females, thus observed sex difference might be related in some way to the reference itself(who 2007)

(Magnetite and determinant of stunting 2009)

#### **6.5. Immunizations status of the children:**

According immunization that children that completed immunization have more occurrence of stunting than children that not completed immunization have lesser occurrence of stunted it show the completion of immunization not have effect to stunted however in some study immunization have their role to reducing malnutrition for example children without measles have high risk of measles complication of measles lead to malnutrition. in on study by Indian center research done To examine the presenting characteristics, including nutritional status, of young children without measles immunization and to suggest -specific effects of measles immunization were observed. Fifty-one per cent of the children without measles immunization were stunted, 76% were underweight, and 48% were wasted. The non-immunized children were twice as likely to be stunted, underweight, and wasted than the immunized children.

Also one study in Vietnam shows that the overall prevalence of underweight among children was 19.1%, and the prevalence of stunting was 14.4%. Children whose fathers did not bring them to a medical facility for immunization were about 1.7 times more likely to be underweight and than those whose fathers did bring them for immunization after child's age(Tran, Bich Huu 2008)(F Chowdhury, Ashraful I Khan 2007)

## **6.6 socioeconomic factors:**

6.3.1 According to mother age of >35 year have high prevalence of stunted and also age between 20-35 years is with high prevalence stunted than age group of <20 years mothers. Not association with stunting

Age of mother<35 years have significant association with stunting (p-value=0.002 more risk to stunting OR=1.75 ) also in age mother 20-35 according multivariate analysis have OR= 1.57 time risk to stunted children

Some study that done by Indians showed that Stunting was commonest where mother's age was <35 years (87.5%) as compared to prevalence of 40.3% where the age was more than 30 years It show the deferent place have deferent association with the age of mother(A Mittal, J Singh, SK Ahluwalia 2007-)

Some study in over 10 medal and low income country done by united nation evident that age of mother have their effect to stunting woman, is at a higher risk of infant mortality and stunting also they mentioned factor to risk of mother age socioeconomic status of, mother and also biological immaturity young mother who birth in age <27-29 the first birth is with the high risk of stunting and high mortality (*United Nations2011*)

## **6.7 Education of mother:**

According to education of mother more stunted children are in primary and less than primary school are higher percentage than senior and high school that have low proportion of stunted children it shows that level of high education has less risk for stunting and educated mothers know how to care their children.

*There is significant association between education of mother and stunting ( $p$ -value=0.002) also study that by Indian done tells Mother's education was related to the prevalence of stunting, schooling was more than high school as compared to prevalence of 65.25% where mother was illiterate to risk of stunting. (A Mittal, J Singh, SK Ahluwalia 2007)*

Better nutritional profile of under-five of educated mother indicates that right to have education to achieve 100% literacy will help in promoting the nutritional status of children as educated mothers are more aware of the health services available and also the acceptance to utilize the same better among them. (A Mittal, J Singh, SK Ahluwalia 2007)

#### **6.8. Occupation of mother:**

According to occupation of mother that mother who don't have job or housewife she has more stunted children because of low income than that mother that have job and the former mother that all time busy with land have more percentage of stunted children. so it shows that mother who don't have job she have less income and not able to nourish their children. same study tells Mother's engagement in some occupation adversely affected child's growth as shown by the results that 58.97% were stunted where mother was employed as compared to prevalence of 44.8% where mother was a housewife. (A Mittal, J Singh, SK Ahluwalia A Mittal, J Singh, SK Ahluwalia 2007)

#### **6.9 Income level of family:**



We divided family according to income level in five level in richest level is have less stunted children than poor that have higher percentage of stunted children and after controlling other variable the risk of poor people (OR=1.1) time more the other level. According to World Bank development research group in 2000

in almost all countries, the poorest quintile has the highest rate of malnutrition-however malnutrition is measured .poor having elevated rates of malnutrition; rather, the rate of malnutrition declines with living standards, although not always monotonically so The extent to which the rates decrease indicates how much more the poor suffer from higher rates of malnutrition than the rich people For example, rate of stunting among the lowest quintile is about 50%, whilst in the second quintile it is 44%. Then it decreases continuously until it reaches 10%. The prevalence of stunting among the poorest segment of populations relatively high compared in many countries.

in one study that done by UN in Bangladesh shows that children in the poorest 20% of households are more than three time as likely to suffer from adverse growth rate stunting as children from the wealthiest 20% of households (OR=3.6; 95% CI: 3.0, 4.3). This study concludes that household wealth inequality is strongly associated with childhood adverse growth rate stunting. Reducing poverty and making services more available and accessible to the poor are essential to improving overall childhood health and nutritional status (World Bank; 2000.)

#### **6.10 water and sanitation factors**

**According to source of drinking water:** that family that using from protected spring has higher percentage stunted children Than respectively family using protected well have less percentage of stunted and using water company have lesser percentage stunted children. it show that protected

spring and protected well is by using all people for example in village many people using from a well or one spring risk of pollution with infection going higher there is significant association source water with stunting (p-value=0.001)

**water processing before drinking** :people use many method to safe water that people using process for water safe is higher 46.01% then people not using this process have less 45.43% for stunted there is no significant association between water processing and stunting it show that method water processing mostly used by common people not technically scientific so in many time it couldn't safe the unsafe water and water is with pathogen that cause illness and diaries near children that important cause for stunted.

In one study, we found a high prevalence of stunting and diarrhea among children aged less than five years in an area where people used irrigation water for domestic needs. Poor availability of water for domestic use was the most important risk factor for diarrhea and stunted growth in this community in Pakistan. Among the children of households having no water connection and no storage facility, a large part of the longitudinal prevalence of diarrhea and of the prevalence of stunting could be attributed to supply of insufficient water. Improving the availability of water for domestic use could, therefore, have an important impact on health of children in the area, especially when combined with improvements in sanitary facilities. We have shown before that when sufficient quantities of water and sanitary facilities are available, improvements in quality of water would have additional health benefits (Wim van der Hoek<sup>1</sup>, Sabiena G1998)

### **6.11. Use of soap**

Use of soap before meal is 45.88% and non-using soap is 45.18% don't have any deferent with occurrence of stunting there is no significant association with use of soap before meal (p-value=0.726

About usage of soap for hygiene activity that mother who note use soap before breast feeding have higher 46.77% stunted than who using soap before breast feeding 35.21% *and have significant association with stunt(p-value=0.001that mother who not using soap in hygen activity have 1.5 time risk to stunting*

*Usage of soap before preparing food not have significant association with stunting (P-value=0.583*

Usage of soap after defecation who note use soap 48.61% stunted and who mother use soap have 44.27% stunted there is significant association between use of soap and stunted (p-value=0.048 who mother not use soap have risk of 1.19 time more to stunting

In multivariate analysis not use of soap have (OR=1.5) time to stunted then usage of soap in hygiene activity household that spent less soap a child from that household less use from soap is twice a likely to suffer from dysentery in rural area 40% to be stunted 24% likely to suffer from diarrhea compare to child average that more using from soap people to be convinced to use more use from soap 50 case dysentery per year 150 case diarrhea per year 60 case of stunting per household children could be prevented ([www.cietpakistan@ciet.org](mailto:www.cietpakistan@ciet.org))

**6.4.4 lavatory;** Also in having lavatory in the family for good hygiene we used three category having lavatory with septic tanks have less percentage of stunted 45.44% without septic tank 40.99% and not having lavatory was with high 48.31% stunted there is not significant association with having lavatory with stunted because of that community that don't have lavatory or open toilet

large share of the solids and liquids people eat and drink are passed on in urine and feces. Human

Waste contains potentially valuable and recyclable resources such as water, energy, urea, salts, and minerals. But it also consists of large amounts of useful as well as harmful microorganisms, mostly bacteria, as well as pathogens ranging in size from viruses to helminthes. Many diseases are passed on from person to person through the fecal-oral pathway—pathogens in one person's waste end up ingested by another. For some diseases this is the primary transmission pathway, for others it is one of several.

Human waste also contains residues of the many complex engineered chemicals people use, such as food additives, antibiotics, hormones, and nutritional supplements, some of which remain in the environment and result in unsafe accumulation in waste sinks so it cause of many illness with low hygiene environment that cause illness and malnutrition near children(World Health Organization and UNICEF. (2010).

### **6.13. Access to health service**

In the health service if people gate illness where they go for their treatment or seeking health care that people who use community have high percentage stunted and have (OR=1.36) risk to stunting than respectively self-medication have less risk to stunted than government and private facility seeking care are less risk to stunting.

Also in term of chronic and long illness that people that using community have high risk to stunted than community government facility and private facility there is no significant association between long sickness utilization of service with stunting (p-value=0.096) stunting. Question why risk stunting is high in community seeking care than other facility there is many reason

Study in Nepal shows Even where health care services are available, the cost of seeking care may delay or prevent poor households from accessing them. The cost of seeking care may be thought of as comprising direct costs such as user fees indirect cost such as cost for transportation) and opportunity costs (such as lost wages). Such costs weigh more heavily upon poor households generally lower levels of health-related knowledge and awareness among poor and marginalized groups may result in low demand for health care services.in private and government facility.

To realize the benefits of seeking care for the sick children caregivers must know where and when to seek appropriate health care delay in seeking health care have been estimate to 70% of children death however health information me not reach to poor and marginalized people for variety of reason including physical distance to health facility and limited outreach in many area low level of education and linguistic or cultural barriers may likewise make health information or other health-related information, education and communication (IEC) inaccessible. This may be especially true for ethnic minorities, who often live in rural and remote areas and face unique cultural and linguistic barriers. Women's typically lower levels of literacy may likewise place many forms of health information, such as print media, beyond their reach, while restrictions on their mobility may limit their exposure to new health-related ideas and practices. Distance and long travel times to health facilities remain key barriers to access in many rural communities (who 2005)

#### **6.14. Strength of our study:**

1. More than 66% of our independent variables resulted significant association with dependent variable. Only 33.3% variable was not significant result.
2. Three category descriptive bivariate and multivariate analysis done for batter outcome.

4. Discussion for farther analysis and comparison done with other studies.
5. advisor nutrition department and department of data management were sported us and were available to analysis of data.
6. All our thesis work is according to research method truck

#### **6.15. Limitation of the study**

1. As in this study we used secondary data for analysis (because lack of resource and time) thus the result of secondary data some time do not answer to the desire objective of the investigator.
2. while our outcome are concluded base on the secondary data which was collected earlier in 2007 by the center of health research university of Indonesia with different purpose and aspect of study and different analysis indicators. by using secondary data the researcher could only analysis those variables which were in former study.
3. In this study we use cross sectional approach so the cause and effect association well is underestimated.
4. mostly many information that we need to explain about procedure collecting data and exact date of starting completion of study we couldn't get form resource that data collected.
5. Also if we use primary data we will have broad concept about demographic culture attitude behavior of the subject people than we can describe broader outcome explanation for our analysis
6. According our objective some variable that we need to stringent our study we note found from secondary data.
7. data was collected in Indonesian language and translated to English if any phrase or words are not exactly the same with local terms this will the limitation of investigator
8. stunting is most prevalent in Indonesia not in Afghanistan so our understanding was me be limited about characteristic of stunt me it effect to broader statement our information about cause distribution pathogenesis sign and symptom of stunting.

## Chapter 7

### 7.1. Conclusion;

According to our objective in the study we want assess the relationship of factor socioeconomic, water and sanitation, access to health services and status immunization of the children with occurrence of stunting .in Lombok and Sikka District .after analysis of collecting data and more interpretation and discussion we arrive in this conclusion .

- Among 2493 subject children in mentioned children 54.47 were normal and 45.53% were stunted.
- Sex of the children has strong association with stunting and male child was more risk to stunt than female.
- In socio economic age of mother <35 years have (OR=1.57) time more risk of stunted and age 20-34have (OR=1.76 time risk to stunting. age of mother have significantly association with stunting.
- In education of mother that mother who are less than primary school have more risk to stunting than respectively each level of higher education the risk of stunted is going down and education of mother have significant association with stunting.
- In occupation of mother that mother who are farmer have high risk for stunted children and also the mother who have job have higher risk stunted children than mother who do not have job and between occupation of mother and stunting is significant association.
- In according socioeconomic level the poor family level is more occurrence of stunted than the rich level family by increasing each degree of income of family level of stunting is going down.
- In water source that family that using from protected spring has more occurrence of stunted children than respectively protected well and

Water Company is lesser risk to stunted there is significant association between sources of drinking water and stunted.

- In use of soap that mother who not use soap during her hygiene activity have more risk (OR=1.4) time risk to stunted children there is significant association between use of soap with stunted.
- In health service factors for prolonged and chronic illness care that family that using community medication have high risk of stunted than respectively self-medication ,private and government facility using for their prolonged illness have less risk to stunted there is significant association between chronic illness care and stunted.

### **7.2 recommendations:**

- After analysis of data the prevalence of stunted children is very high in Sikka and Lombok District 45.5% stunted so government and public health authority must pay special attention for reducing number of stunted in mentioned district by empowering community and establishing feeding center in area (like positive deviance ) .equipped health staff to educate the people and distribute supplementary food for malnourished children in the area with proper monitoring and evaluation and reporting system with additional conducting research for finding the mean cause of stunted in mentioned district.
- In our finding children 36-59 moth is more the risk of stunting local government and health staff must pay attention to educate community about exclusive breast feeding up to 24 month and supplementary feeding during weaning period for children and attention for protection of mother about health and enough food for pregnant mother during pregnancy.
- Mother with low education have more stunted children so duty of local and central government to encourage and make opportunity for



enrolment of female to school and higher education. Provide training and education for low educated mother via health facility and health worker or conducting long term course and short term literacy course training for low educated mother to support the knowledge of mother for good care of their children.

- In occupation of mother the mother who have farmer have more stunted children so local government make opportunity for farmer women when they busy with their job making facility that they put their children there for example work field kindergarten and play yard for children in work place or other kind of facility for farmer mother.
- in our study stunted is more prevalent in poor family than it decrees by each level of family high level income also many other study confirm this issue strong association of family high income with low prevalence of stunting it is duty of government to make opportunity of work for poor and encourage and support of small business men and skill men by providing small loan with long term installment without charge and technical assistance to them for improving current enterprise and welfare support for poorest family and finally high coverage of health social insurance
- .
- Use of soap in hygiene activity like before preparing food before breast feeding before child feeding after defecation after cleaning child defecation and other kind of hygiene activity is important for preventing malnutrition stunted and prevention of diseases local government and health stakeholder must educate people by media health facility staff poster announcement to encourage them for the using soap for their hygiene activity.
- .

- In access to health services in the term of prolonged and chronic illness that people using community have more stunted children it is the responsibility of government to make them opportunity by establishing health center facility in remote area and district and accessible them health service by providing health insource social security institution specially for poor people by decreasing health cost unit and proper supervision and monitoring of effectiveness and efficiency of health care system in public and private in all facility that providing health service for the people.

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