

**Nutrition status and risk factors
for under-nutrition in young
children in North Maluku,
Indonesia, in 2004 following a
period of civil unrest**

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I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a higher degree to any other University or Institution.

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*“Remember HIM all the time and
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TABLE OF CONTENTS

Acknowledgments.....	iii
Table of Contents.....	viii
Synopsis.....	ix
List of abbreviations and definitions.....	xv
Chapter 1 – Nutrition status and risk factors for malnutrition in young children in North Maluku Indonesia.....	1
Chapter 2 – Literature review.....	10
Chapter 3 – Methodology.....	72
Chapter 4 – Nutritional status in young children in North Maluku Indonesia, 2004.....	125
Chapter 5 – Socio-economic factors associated with children with stunting in North Maluku Indonesia.....	220
Chapter 6 – Socio-economic factors associated with children with wasting in North Maluku Indonesia.....	271
Chapter 7 – Comparison of nutritional status of preschool children based on World Health Organization growth reference.....	307
Chapter 8 – Conclusion.....	372

SYNOPSIS

NUTRITION STATUS AND RISK FACTORS FOR UNDER NUTRITION IN YOUNG CHILDREN IN NORTH MALUKU, INDONESIA, IN 2004 FOLLOWING A PERIOD OF CIVIL UNREST

Introduction

North Maluku is a new province in Indonesia, which separated from Maluku Province following a period of civil unrest. Malnutrition became a major issue in North Maluku especially for children aged less than five years old. Post-conflict, it is a matter of great concern that the health and nutrition of pre-school aged children remains poor. This current research provides data to inform and assist the local government to establish appropriate local nutrition programs and to promote a better life and enhanced nutritional status for young children.

Aim

The aim of this study was to assess the nutritional status of pre-school aged children in North Maluku Province, Indonesia, following a period of civil unrest, and to examine the risk factors for stunting and wasting, including socioeconomic factors, to inform the development of intervention programs.

Methods

Using data from the North Maluku Province Health survey, this study examined the prevalence of children who were underweight, severely underweight, stunted, severely stunted, wasted and severely wasted in the North Maluku province of Indonesia in 2004. Data on being severely underweight, severely stunted and severely wasted in young children is often not reported in other studies of child nutrition in Indonesia and more widely.

The total sample size from the original cross sectional health survey was 3,000 households from within the eight districts of North Maluku province. From this sampling frame, the current work involved the analysis of quantitative data from families with children aged between 0 to 59 months. Demographic and socio-

economic data were collected by questionnaire from 2,168 children and households. Economic status of the household was assessed via an inventory of household assets and facilities. Anthropometric data were taken by trained enumerators, measured in accordance with standard anthropometric techniques (WHO 1995). All the anthropometric indicators of a child's nutritional status used in the survey were expressed as the Standard Deviation Score (Z-Score) to describe categories of low weight-for-age (or underweight), low height-for-age (or stunting) and low weight-for-height (or wasting) with reference to the 2006 World Health Organisation (WHO) international child growth standards.

Prevalence with 95% confidence intervals (95%CI) was calculated for categorised underweight, stunting and wasting, and distributions were calculated for six-month age groups, sex, and geographical district and across family and child level factors. Multivariate logistic regression was used to model socioeconomic risk factors associated with stunting and wasting in children aged 0-59 months for family and child level characteristics. A comparison of nutritional status indicators using the current 2006 WHO international child growth standards and the former 1978 National Centre for Health Statistics (NCHS)/ WHO international child growth references was undertaken.

Results

Of the 2,168 children, 33% were underweight or severely underweight, 56% were stunted or severely stunted and 18% were wasted or severely wasted, indicating significant under-nutrition of the children in this new province. The prevalence of underweight (25%) was categorised as high (20-29%) and the prevalence of stunting (38%) was categorised as high (30 to 39%) according to WHO criteria. The prevalence of severely underweight children, and children with severe stunting and severe wasting were categorised as low.

The prevalence of all anthropometric indicators: underweight, severely underweight, stunting, severe stunting, wasting and severe wasting; were higher in boys than in girls and generally lower in the urban district of Tidore compared with other districts.

The height-for-age Z-score distribution, weight-for-height Z-score distribution and weight-for-age Z-score distribution for children 0 to 59 months in North Maluku were each shifted to the left below the reference indicating higher levels of underweight, stunting and wasting compared to the 2006 WHO reference population.

The following factors were statistically significantly associated with stunting on multivariate analysis in children aged 0 to 59 months: household wealth, gender of the child, the child's age in months and visits to the local health service in the previous three months. The following factors were statistically significantly associated with severe stunting on multivariate analysis in children aged 0 to 59 months: father's occupation, household wealth, gender of the child and the child's age in months.

There were no family level or child level characteristics statistically significantly associated with wasting on multivariate analysis in children aged 0 to 59 months, however gender was significantly associated with severe wasting in children aged 0 to 59 months with girls have reduced odds of severe wasting compared to boys.

The prevalence of nutritional status indicators using the former 1978 NCHS/WHO growth reference compared with the current 2006 WHO growth standards in children less than five years of age in North Maluku Province Indonesia in 2004, were not statistically significantly different for any of the nutritional indicators.

Conclusions

As a new province in Indonesia, it was anticipated that North Maluku would benefit from appropriate and timely investigation into the nutrition status and risk factors for under-nutrition in young children. This study provides valuable information for local government regarding childhood nutrition, which in turn can inform the implementation of appropriate nutritional programs in the future to provide vital information on preventable ill-health and to identify where health gains can be made to prevent under-nutrition. This study can also provide evidence which allows policy-makers to direct resources to the most vulnerable segments of the population, and thus better utilise resources.

LIST OF ABBREVIATIONS AND DEFINITIONS

ADB	Asian Development Bank
Anthropometry	Human body measurements.
BMI	Body Mass Index
CBS	Central Bureau of Statistics
CFNH-UH	Centre for Food, Nutrition and Health, Hasanuddin University
CI	Confidence Interval
cm	centimetres
FAO	Food and Agriculture Organization
HFA	height (or length) for age
Kg	Kilograms
Km	Kilometres
KMS	Kartu Menuju Sehat of Health Card Children to monitor

	their nutrition status for the age 0-59 months
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistics
OR	Odds Ratio
Polindes	Village Delivery Posts
Puskesmas	Indonesian Health Centre for District level
Pustus	Indonesian Health Posts for village level
r	Correlation coefficient
SD	Standard deviation
Sq	Square
Stunting	Height-for-age below -2 SD from the National Centre for Health Statistics/WHO reference median value.

Continued...

Susenas	Type surveys in Indonesia which are integrated into routine Central Bureau of Statistics annual surveys consist of social and economic variables.
TV	Television
UN	UNITED NATION
Underweight	Weight-for-age below -2 SD from the National Centre for Health Statistics/WHO reference median value.
UNICEF	The United Nations International Children's Fund
Wasting	Weight-for-height below -2 SD from the National Centre for Health Statistics/WHO reference median value
WFA	weight-for-age
WFH	weight-for-height
WHO	World Health Organization
Z-score (or SD-score)	The deviation of an individual's value from the median value of a reference population, divided by the standard deviation of the reference population.
IBT	Indonesia Bagian Timur (Eastern Indonesia island

	survey);
SUVITA	Survey Vitamin A
SKIA	Mother and child survey
NSS	Nutrition & health surveillance survey
SKRT	National health and household survey
Ev. JPS	survey on impact of social safety net project