## Socio-Economic Correlates of Mortality in Japan and ASEAN

The National Institute for Research Advancement (NIRA) of Japan was founded in 1974 under a special legislation of the Parliament as a result of initiatives taken by representatives from the government, business, labour, and academic communities. NIRA's central purpose is the advancement of interdisciplinary research which seeks viable solutions to the major problems confronting modern society.

The Institute of Southeast Asian Studies was established as an autonomous organization in May 1968. It is a regional research centre for scholars and other specialists concerned with modern Southeast Asia, particularly the multi-faceted problems of stability and security, economic development, and political and social change.

The Institute is governed by a twenty-two-member Board of Trustees comprising nominees from the Singapore Government, the National University of Singapore, the various Chambers of Commerce, and professional and civic organizations. A ten-man Executive Committee oversees day-to-day operations; it is chaired by the Director, the Institute's chief academic and administrative officer.

# Socio-Economic Correlates of Mortality in Japan and ASEAN

Edited by Ng Shui Meng

Institute of Southeast Asian Studies

National Institute for Research Advancement, Japan and Institute of Southeast Asian Studies, Singapore

#### Cataloguing in Publication Data

Socio-economic correlates of mortality in ASEAN and Japan/editor, Ng Shui Meng. Country reports presented at the Workshop on Socio-economic Correlates of Mortality Differentials in Japan and ASEAN, Singapore, 30-31 August 1984.

- 1. Mortality -- Social aspects -- ASEAN -- Congresses.
- Mortality -- Social aspects -- Japan -- Congresses.
- 3. Mortality -- Economic aspects -- ASEAN -- Congresses.
- 4. Mortality -- Economic aspects -- Japan -- Congresses.
- Ng, Shui Meng.
- II. Workshop on Socio-economic Correlates of Mortality Differentials in Japan and ASEAN (1984: Singapore)

HB1471 S67 1986

ISBN 9971-988-21-6

Published by Institute of Southeast Asian Studies Heng Mui Keng Terrace Pasir Panjang Singapore 0511

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the Institute of Southeast Asian Studies.

© 1986 Institute of Southeast Asian Studies

The responsibility for facts and opinions expressed in this publication rests exclusively with the contributors and their interpretations do not necessarily reflect the views or the policy of the Institute or its supporters.

Printed in Singapore by Fu Loong Lithographers Pte Ltd.

### CONTENTS

		Page
NOTES 0	N CONTRIBUTORS	ix
LIST OF	TABLES	xi
LIST OF	FIGURES	xix
I	SOCIO-ECONOMIC CORRELATES OF MORTALITY IN JAPAN AND ASEAN	1
	General Mortality Trend in Japan and ASEAN The Mortality Project	1 6 8
	Mortality Trends: Crude Death Rates Infant Mortality Expectation of Life	8 10 12
	Causes of Death	13
II	SOCIO-ECONOMIC CORRELATES OF MORTALITY IN JAPAN	18
	Mortality Trends in Japan Mortality Rates by Sex and Age Group	18 19
	Differentials in Mortality among Socio-economic Sub-populations Sources of Data Methodology	20 21 21
	Differentials in Mortality among Occupational Groups Regional Differences in Japanese Mortality Indirect Estimates of Child Mortality	22 26 28
	Mortality Differentials by Education Multivariate Analysis of Mortality Differentials	29 32

		Page
	Methodology Findings Stepwise Regression Analysis Conclusion	35 36 42 44
III	SOCIO-ECONOMIC CORRELATES OF MORTALITY IN INDONESIA	62
	Introduction Mortality Level in Indonesia Conceptual Framework of Mortality Studies Objectives of the Study Methodology Sources of Data Estimation of Infant Mortality Rate Correlation of Variables Regression Coefficients Effects of Socio-economic Variables Effects of Intermediate Variables Joint Effects of Socio-economic and Intermediate Variables Alternative Mode of Analysis Summary and Conclusion	62 63 65 68 69 72 73 79 79 84 89
IV	SOCIO-ECONOMIC CORRELATES OF MORTALITY IN PENINSULAR MALAYSIA	104
	Introduction Demographic Situation Health Programme Background and Objectives of the Study Related Research Sources of Data Trends and Differentials in Ethnic Mortality:	104 104 105 106 106
	An Analysis of Vital Statistics Causes of Deaths Indirect Methods for Estimating Mortality	108 114 116
	Preliminary Examinations of Areal Differentials in Mortality The Variables Areal Differences in Mortality Inter-correlations between Variables Factors Affecting Mortality	118 118 120 125 131

		Page
	Multivariate Areal Analysis of Socio-Economic	
	Correlations of Mortality	132
	Hierarchical Regression Analysis	133
	Ethnic Variables	133
	Urbanization	147
	Education Variables	147
	Percentage of Households Owning TV	148
	Percentage of Labour Force Engaged in	2.10
	Non-Agricultural Activities	148
	Percentage of Households Having Flush	
	Toilet Facilities (Sanitation Variables)	149
	Supply of Piped Water	149
	Percentage of Births Delivered at Home	150
	Availability of Hospital Beds	150
	Family Planning	150
	Conclusions and Recommendations	151
٧	SOCIO-ECONOMIC CORRELATES OF MORTALITY	
	IN THE PHILIPPINES	155
	Introduction	155
	Data Sources	156
	The Mortality Experience	158
	Socio-economic Correlates of Philippine	
	Mortality	173
	Inter-correlation of Variables	177
	Analysing the Multiple Regression Results	180
	Impact of Socio-economic Dimensions	180
	Hierarchical Regression Analysis	187
	Assessing Combined Effects of	77567-58
	Socio-economic Factors	191
	Summary and Conclusions	198
VI	SOCIO-ECONOMIC CORRELATES OF MORTALITY	100
	IN SINGAPORE	206
	Introduction	206
	Objective and Design of the Study	207
	Data Sources	208
	Crude Death Rate	209
	Infant Mortality	210
	Life Expectancy	215
	Ethnic Differentials	216
	Age-specific Death Rates Ethnic Differentials in Life Expectancy	222 226
	COURT DIFFERENCIALS IN LITE EXDECIMEN	//h

		Page
	Causes of Death	226
	Socio-economic Change in Singapore Socio-economic Correlates of Mortality	227
	Decline in Singapore	238
	The Variables	240
	Serial Correlation	242
	Bivariate Analysis	243
	Multiple Regression Analysis: Standard	1,77,7,8
	Regression Analysis	246
	Hierarchical Analysis	251
	Summary and Conclusion	252
VII	SOCIO-ECONOMIC CORRELATES OF MORTALITY	
	IN THAILAND	260
8	Introduction	260
	A Review of Mortality Studies	261
	Sources of Data and their Reliability	268
	Statistical Methods of Analysis	268
	The Findings	270
	Hierarchical Regression Analysis of Change	281
	Path Analysis	285
	Conclusion	290

#### NOTES ON CONTRIBUTORS

Gabriel C. Alvarez is Senior Lecturer, Department of Sociology at the National University of Singapore. He was elected President of the Philippine Sociological Society in 1978 and has served as consultant in a number of research projects on urban planning and rural development.

Lukman Ismail is Senior Lecturer at the Academy of Statistics, Jakarta, Lecturer in Statistical Methods in Ecological Systems at the University of Indonesia and Chief of Training Section at the Statistical Education and Training Centre, Jakarta.

**Ng Shui Meng** is Senior Fellow at the Institute of Southeast Asian Studies, Singapore. Her research interests include population and contemporary developments in Indochina. She is currently conducting a study on the Vietnamese community in Laos.

Shinsuke Morio is Deputy Director of the Infectious Diseases Surveillance Division of the Ministry of Health and Welfare in Japan. His current research interests include public health particularly in the prevention of infectious diseases.

**Noor Laily binti Dato' Abu Bakar** was Director-General at the National Population and Family Development Board. Her current research interests are on women in development and child development.

Suchart Prasithrathsint is Professor of Sociology (Demography) at the National Institute of Development Administration (NIDA). His research interests cover various issues of population and development interactions. He is President of the Thai University Research Association.

Laddawan Rodmanee is Lecturer in Medical and Health Social Sciences at Mahidol University. Her research interests include aspects of medical and health problems and the interactions of health, environment and population.

Budi Soeradji is Chief, Family Planning and Population Bureau, National Development Planning Agency and Director, Academy of Statistics, Central Bureau of Statistics, Jakarta. His current research interests include family planning evaluation, fertility, mortality, and population and development.

**Kanikar Sookasame** is Assistant Professor of Sociology (Demography) at the National Institute of Development Administration in Thailand. Her research interests include fertility, mortality, migration, and rural-urban development.

Shigesato Takahashi is Research Officer, Division of Population Quality and Human Reproduction, Ministry of Health and Welfare in Japan. His current research interests include demographic changes in Japanese mortality and factors affecting cause structure of mortality in developed countries.

**Tey Nai Peng** is Assistant Director, Research, Evaluation and Management Information System Division at the National Population and Family Development Board in Malaysia. His current research interests are on population mobility, urbanization and KAP (Knowledge, Attitude and Practice) studies.

### LIST OF TABLES

		Page
I:	Japan and ASEAN	
1	Crude Death Rates per 1,000 by Region and Country in Asia and Southeast Asia, 1950-75	4
II:	Japan	
1	Age-standardized Death Rate by Occupation	23
2	Age-standardized Death Rate from Various Causes of Death by Occupation, Selected Years	25
3	Age-standardized Death Rate from Various Causes of Death, Selected Years	27
4	Estimate of Child Mortality, q(a), by Rural/Urban Residence based on the Eighth National Fertility Survey Data	29
5	Estimate of Child Mortality, q(a), by the Mother's Educational Qualification, based on the Second National Fertility Survey Data	30
6	Estimate of Child Mortality, q(a), by the Mother's Educational Group, based on Sixth National Fertility Survey Data	31
7	Estimate of Child Mortality, q(a), by the Mother's Educational Group, based on the Eighth National Fertility Survey Data	32

		Page
8	Mean and Standard Deviation of Infant Mortality Rate in 1970, 1975, 1980	36
9	Means of 40 Predictor Variables in 1970, 1975, 1980	38
10	Correlation Coefficients between Infant Mortality Rate (1970, 1975, 1980) and Predictor Variables in 1970, 1975, 1980	39
11	Hierarchical Regression Analysis of Infant Mortality Rate, 1970	40
12	Hierarchical Regression Analysis of Infant Mortality Rate, 1975	41
13	Hierarchical Regression Analysis of Infant Mortality Rate, 1980	41
14	Stepwise Regression Results and Analysis of Variance in $1970$	42
15	Stepwise Regression Results and Analysis of Variance in $1975$	43
16	Stepwise Regression Results and Analysis of Variance in 1980	44
III:	Indonesia	
1	Estimated Values of $2q_0$ Based on Different Sets of Data on Techniques of Estimation	75
2	Estimated Values of $\mathbf{q}_0$ Based on Different Sets of Data and Regions of Life Table Model	75
3	Correlation Coefficients of Variables with Infant Mortality Rate and their Significance Levels	80
4	Correlation Matrix of Variables Influencing Infant Mortality Rate	81
5	Partial Regression Coefficients of Background and Intermediate Variables with Infant Mortality Rate	83
6	Hierarchical Regression Analysis of Socio-economic Variables on Infant Mortality Rate	86

		Page
7	Hierarchical Regression Analysis of Intermediate Variables on Infant Mortality Rate	90
8	Hierarchical Regression Analysis of Infant Mortality Rate	93
9	Coefficient of Determination and Multiple Correlation Coefficient of Hierarchical Regression Analysis on Infant Mortality Rate	95
10	$\ensuremath{R}^2$ of Each Variable by Mode of Regression Analysis on Infant Mortality Rate	95
IV:	Peninsular Malaysia	
1	Trends in Crude Death Rates, Infant Mortality Rate, Neo-natal Mortality Rate and Toddler Mortality Rate by Ethnic Group, Peninsular Malaysia, 1957-80	109
2	Age-specific Death Rates by Ethnicity and Sex, Peninsular Malaysia, 1980	110
3	Expectation of Life at Birth, $e_0$ , for Peninsular Malaysia by Sex and Ethnic Group, 1957-79	112
4	Still Birth Rate by Ethnicity, Place of Residence and Age of Mother, Peninsular Malaysia, 1982	113
5	Major Causes of Deaths in Government Hospitals in Peninsular Malaysia by Rank Order and Percentage, 1970, 1977 and 1980	115
6	Mortality Estimates Derived by Applying Trussell's Method to Data from Malaysia's Fertility and Family Survey (1974) on Proportion of Children Dead by Marital Duration and Selected Socio-	
	economic Characteristics	117
7	Summary Statistics of Study Variations	121
8	Crude Death Rate and Infant Mortality Rate by States and Ethnicity, 1982	124
9	Comparison of Socio-economic Background of Districts with the Five Highest and Five Lowest Infant Mortality Rate, 1982	126

		Page
10	Zero-order Correlations between Mortality Rates and Socio-economic, Demographic and Programme Variables at the District Level	128
11	Hierarchical Regression Analysis in Crude Death Rate on Socio-economic Variables	134
12	Hierarchical Regression Analysis of Infant Mortality Rate on Socio-economic Variables	137
13	Hierarchical Regression Analysis of Toddler Mortality Rate on Socio-economic Variables	140
14	Hierarchical Regression Analysis of Still Birth Rate on Socio-economic Variables	143
۷:	Philippines	
1	Estimated Adjusted Annual Crude Death Rates, Philippines, 1903-71	159
2	Cause-specific Death Rates for Ten Leading Causes of Death, Philippines, 1960-78	164
3	Percentage Change of Cause-specific Death Rates for Ten Leading Causes of Death, Philippines, 1960-78	168
4	Infant Cause-specific Mortality Rates for Leading Causes of Death, Philippines, 1972-78	168
5	Crude Death Rates Estimated for the Twelve Philippine Regions, 1950-79	169
6	Infant Mortality Rate Estimated for the Twelve Philippine Regions, 1950-79	171
7	Selected Socio-economic Measures and their Respective Dimensions, Used as Independent Variables in Multiple Regression Analysis	175
8	Zero-order Correlation Matrices of the Socio- economic Variables	178
9	Inter-correlation of the Twelve Socio-economic Variables with the Three Mortality Measures (Zero-order Correlation Coefficients)	181

		Page
10	Standard Multiple Regression Results Assessing the Various Socio-economic Dimensions Affecting Infant Mortality Rate	183
11	Standard Multiple Regression Results Assessing the Various Socio-economic Dimensions Affecting Maternal Mortality Rate	185
12	Net Effect of the Six Socio-economic Factors on Infant Mortality Rate, as Measured by the R Square Change as Derived from Hierarchical Regression Results	189
13	Net Effect of the Six Socio-economic Factors on Maternal Mortality Rate, as Measured by the R Square Change as Derived from Hierarchical Regression Results	190
14	Net Effect of the Six Socio-economic Factors on Infant Mortality Rate, as Measured by the R Square Change as Derived from the Revised Hierarchical Regression Results	192
15	Net Effect of the Six Socio-economic Factors on Maternal Mortality Rate, as Measured by the R Square Change as Derived from the Revised Hierarchical Regression Results	193
16	Squared Multiple Correlations of the Independent Variables Used in the Multiple Regression Analysis	194
17	Standard Multiple Regression Results Assessing Socio-economic Variables Affecting Infant Mortality Rate	196
18	Stepwise Multiple Regression Results Assessing Socio-economic Variables Affecting Infant Mortality Rate	196
19	Standard Multiple Regression Results Assessing Socio-economic Variables Affecting Maternal Mortality Rate	197
20	Stepwise Multiple Regression Results Assessing Socio-economic Variables Affecting Maternal Mortality Rate	197

		Page
VI:	Singapore	
1	Some Mortality Indicators of Singapore, 1931-41 and 1946-82	212
2	Life Expectancy for Census Years 1957, 1970, 1980	217
3	Crude Death Rates for the Three Main Ethnic Groups, 1886-1980	219
4	Infant Mortality Rates by Ethnic Groups 1931-40 and 1946-80	220
5.1	Age-specific Death Rates, 1957	223
5.2	Age-specific Death Rates, 1970	224
5.3	Age-specific Death Rates, 1980	225
6	Deaths by Broad Groups of Causes, 1970-82	229
7.1	Medical Facilities	233
7.2	Medical Personnel	235
8	Units Constructed and Sold by the Housing and Development Board, 1960-82/83	236
9	Education	238
10	Media and Communication	239
11	Correlation Matrix	244
12.1	Summary Table of Multiple Regression of Demographic Variables (CBR, TFR) on Crude Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate	248
12.2	Summary Table of Multiple Regression of Occupation Variables (PPAMTW, PAWF) on Crude Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate	248
12.3	Summary Table of Multiple Regression of Economic Variables (INC, HOMOWN) on Crude Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate	249

		Page
12.4	Summary Table of Multiple Regression of Education Variables (SECED, ENRA) on Crude Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate	249
12.5	Summary Table of Multiple Regression of Health Variables (HOSBED, MCHMW, DOCPRA, MWWRA) on Crude Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate	250
12.6	Summary Table of Multiple Regression of Media Exposure Variables (OWNRTV, NR) on Crude Death Rate, Infant Mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate	250
13.1	Summary Table of Hierarchical Regression Analysis of Crude Death Rate by Order of Variables	254
13.2	Summary Table of Hierarchical Regression Analysis of Infant Mortality Rate by Order of Variables	255
13.3	Summary Table of Hierarchical Regression Analysis of Neo-natal Mortality Rate by Order of Variables	256
13.4	Summary Table of Hierarchical Regression Analysis of Maternal Mortality Rate by Order of Variables	257
VII:	Thailand	
1	Registered and Estimated Crude Death Rates in Thailand 1945-86	262
2	Estimated Infant Mortality Rates from 1964 and 1974 SPC, 1970 and 1980 Censuses by Regions	266
3	Expectation of Life for Thailand by Region	269
4	Description of Variables Used in the Analysis	271
5	Means of the Variables Used in the Study by Region (1970-80)	272
6	Simple Correlation Coefficient, Means and Standard Deviations of the Variables Used in the Analysis	276
7	Hierarchical Regression Analysis of Crude Death Rate, 1980	278

		Page
8	Hierarchical Regression Analysis of Infant Mortality Rate (North Model)	279
9	Hierarchical Regression Analysis of Infant Mortality Rate (West Model)	280
10	Simple Correlation Coefficients, Means and Standard Deviations of the Variables Used in the Analysis	282
11	Hierarchical Regression Analysis of Crude Death Rate and Infant Mortality Rate (North and West Models)	283

## LIST OF FIGURES

		Page
I:	Japan and ASEAN	
1	Mortality Convergence 1950-75	5
III:	Indonesia	
1	Mosley's Framework for the Study of Factors Influencing Infant and Child Mortality	66
2	Conceptual Model Showing Basic Operations of the Five Intermediate Variables and their Household Social Determinants Leading to	
	Child Morbidity and Mortality	67
3	Diagram of Administrative Divisions in Indonesia	71
4	Operational Framework for the Study on the Determinants of Infant Mortality in Java and Bali	77
5	Revised Operational Framework for the Study of Socio-economic Correlates of Infant Mortality Rate in Java and Bali	85
IV:	Peninsular Malaysia	
1	Infant Mortality Rate Shown in Standard Deviation Units Above and Below the Average for Peninsular Malaysia, 1982 for All Districts	122

		Page
۷:	Philippines	
1	Age-specific Death Rates, 1960, 1978	160
2	Male and Female Age-specific Death Rates, 1978	161
3	Infant Mortality Rates, 1948-78	162
4	Life Expectancy, 1902-80	163
5	Maternal Mortality Rates, 1948-78	165
6	Foetal Death Rates, 1958-78	166
VI:	Singapore	
1	Infant Mortality and Neo-natal Mortality 1940-80	211
2	Infant Mortality of Major Ethnic Groups	221
3	Change in Selected Causes of Death, 1970-82	229
VII:	Thailand	
1	Life Expectancy for Thailand	267
2.1	Path Diagram Illustrating Results of Empirical Assessment of Effects of Social, Economic and Demographic Factors on Crude Death Rate: Model I	287
2.2	Path Diagram Illustrating Results of Empirical Assessment of Effects of Social, Economic and Demographic Factors on Infant Mortality Rate (North Model): Model I	288
2.3		289
3.1	Path Diagram Illustrating Results of Empirical Assessment of the Effects of Social, Economic and Demographic Factors on Crude Death Rate: Model II	291

		Page
3.2	Path Diagram Illustrating Results of Empirical Assessment of the Effects of Social, Economic and Demographic Factors on Infant Mortality Rate (North Model): Model II	292
3.3	Path Diagram Illustrating Results of Empirical Assessment of the Effects of Social, Economic and Demographic Factors on Infant Mortality Rate (West Model): Model II	293